UN environment programme

COVID-19, THE ENVIRONMENT AND FOOD SYSTEMS:

CONTAIN, COPE, AND REBUILD BETTER

FULL REPORT

Covid-19 Green Recovery Working Paper Series

COVID-19 RESPONSE

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An evolving literature

The sheer volume of reports and evidence on COVID-19 is staggering. This is not surprising given the fundamental shifts in opportunities, threats to livelihoods and the associated responses and shifts in behaviours caused by the pandemic. The authors have attempted to synthesize, curate and assess this literature. This process continued until August 2020, at which point the report was drafted and reviewed. Given the sheer volume of evidence generated on a daily basis, the authors may have missed some literature. The situation will also have evolved between August and the date of publication. The report will be released online with associated perspective pieces both on the report itself and more generally on the nexus between COVID-19 macroeconomic responses, food systems and environmental impacts. We encourage readers to submit responses to Salman.Hussain@unep.org and Jacob.Salcone@unep.org.

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FULL REPORT

Kabita Dhami

UN environment programme

COVID-19 RESPONSE

European Commission

INTERNATIONAL CLIMATE INITIATIVE (IKI)

TEEB
The Economics of Ecosystems & Biodiversity

CONTENTS

Key messages 7
Executive summary 13
Introduction 13
Impacts and implications of the pandemic on the economy, the environment and food systems 13
Coping strategies 16
Shortcomings 16
Required action 17
Immediate needs 17
Short-term needs 18
Mid-term needs 19
A systemic approach 19
I. Introduction 21
Readers' guide 22
II. Macroeconomic impacts of the COVID-19 crisis 24
GDP growth, unemployment and inflation 24
Commodity prices and outputs 27
Chapter summary 27
III. Impacts of the COVID-19 crisis on food security 28
Poverty and hunger 28
Global food prices and output 30
Chapter summary 31
IV. Assessing the impacts of the COVID-19 crisis on the nexus between agrifood systems and the environment 32
Ecosystems and biodiversity 34
Other evidence of how ecosystems (especially those providing food crops and livestock) are being impacted by COVID-19 35
Pollution 36
Air emissions 36
Reduced access to water 39
Climate change 40
GHG emissions 40
Emissions from deforestation and land clearing 40

Compound human health impacts 41
Chapter summary 41
V. Coping strategies and their Impacts..... 42
Response by national monetary and fiscal authorities..... 42
Response by international agencies and through aid transfers and debt relief 44
Support for agriculture and the environment in responses to COVID..... 45
Subsidies for agricultural inputs..... 46
Support to develop local supply chains 46
Freer movement of trade 47
Structural difficulties in emergency food imports 47
Cash support programmes 47
Food support programmes 47
Environmental compliance measures..... 48
Chapter summary 49
VI. Lessons from coping with COVID-19 50
The way forward..... 51
VII. What we need to do: immediate and short-term measures 52
Immediate needs..... 52
Actions in the short term 54
Measures to prevent a new pandemic: wildlife and livestock zoonosis..... 57
VIII. What we need to do: measures needed in the medium term 59
Prospects for change across the economy 59
Driving changes in food systems..... 61
Protecting habitats and preventing the degradation of ecosystems..... 63
Promoting low-carbon lifestyles..... 65
IX. Conclusions..... 66
References..... 68

KEY MESSAGES

1. **Governments around the world have invested about $12 trillion to counteract the economic effects of COVID-19. This investment could contribute to progress on the Sustainable Development Goals (SDGs) and global climate targets if invested within a framework that supports both socioeconomic recovery and sustainability. Expenditures must be monitored to deliver multiple benefits simultaneously and guide rebuilding better.**

- COVID-19 is an unprecedented global health and economic crisis. The fiscal and monetary stimulus to stabilize the economy and secure people's livelihoods as part of the global response to the pandemic so far totals $11.7 trillion, equivalent to 13.9 per cent of global GDP. However, so far this investment has mostly ignored linkages to the environment, including the need to prevent further loss and degradation of habitat, which is associated with animal-to-human transmission and the spread of zoonotic diseases like COVID-19. Very little fiscal stimulus has targeted the green economy or investment in natural capital.

- "Rebuilding better" requires targeted investment in sustainable development. The UN framework for the immediate socio-economic response to COVID-19 places environmental sustainability and gender equality at the centre of the United Nations' response to COVID-19. The global response must build on the observed positive changes in people's behaviour and mindset during the crises, including how we travel, how we produce and consume food, and how we use environmental resources. It will require concerted action by governments, the private sector and everyone involved. The complex and globally interconnected nature of this transformation requires multilateral cooperation, monitoring the effects of the investments and sharing positive results. The crisis has created a new situation and requires new thinking and action.

- "Rebuilding better" must also be based on a global – not national – paradigm of aid and development assistance. The pandemic has shown that national borders are irrelevant to global issues like health, food security and sustainability. Landscapes, ecological zones and the nexus between health, environment and economic activities are key features that must be addressed working together.

2. COVID-19 increases poverty and limits access to food. The right to food is a basic human right and should always have highest priority. During a pandemic, food security is a precondition for successfully fighting the virus. Hungry people will not accept measures like social distancing and lockdowns.

Roberto Carlos

- The World Bank estimates that economic contractions could push 70–100 million people into extreme poverty in 2020. Similarly, the number of people suffering acute hunger could double from 135 million to 265 million by the end of the year. As the guardians of household food and water security, women are disproportionately affected by the impacts of the pandemic.

- On average, global food prices have not yet risen during the pandemic and prices are projected to remain stable. Interruption to global trade in agricultural products has also been limited. However, the decline in purchasing power linked to lost income threatens food security. Many poor people have less access to markets and poverty can lead to the consumption of less nutritious food. There have also been supply chain disruptions in many countries and in some cases export restrictions have stopped the flow of food products. Finally, the pandemic has interrupted the movement of migrant workers due to travel restrictions and revealed the dependency of our food systems on cheap labour from other countries and regions.

3. **So far, we have only limited information on the concrete impacts of COVID-19 on the environment, food systems and the SDGs. Initial analysis indicates that investments for economic recovery do not sufficiently address sustainability, concentrating instead on immediate economic risk management. The risk that COVID-19 is undermining sustainable development, especially sustainable food systems, has not yet been addressed.**

- The impact of the health and economic crisis on the SDGs must be closely monitored. Much depends on the extent to which investments and efforts to stabilize the economy are based on clear and transparent measures that support the SDGs. Food systems can support or hinder progress towards many of the 17 goals, including Zero Hunger (2), Good Health and Well-Being (3), Gender Equality (5), Decent Work and Economic Growth (8) and Climate Action (13). Countries, international agencies and all stakeholders must identify how the pandemic threatens food systems and make bold decisions for rebuilding better to ensure food security now and for the future.

- The economic downturn is already hurting ecosystems through cuts to budgets for the management of protected areas. The African Union has reported the postponement and, in some cases, outright cancellation of many sustainable forest management activities and has cited cases of increased poaching. Deforestation of the Amazon has soared in recent months as South America battles the pandemic. These developments increase the risk of new zoonotic diseases. Animal-to-human transmission is the source of 75 per cent of infectious diseases and evidence points to the biodiversity crisis as a contributory factor in the emergence of COVID-19. It is necessary to also analyse and minimize the risks to human health from industrial livestock operations and their impact on the environment.

Ardi Evans

Mega Caesaria

- In island states and coastal areas, people who are unemployed may turn to fishing for food and income, which could increase pressure on near-shore fish stocks. The pandemic may also exacerbate unregulated and unreported small-scale fishing in some areas, while in other areas the drop in demand may increase poverty in fishing communities.

- New research has found that long-term exposure to air pollution may be one of the most important contributors to COVID-19 fatalities around the world. Agrifood systems contribute to overall air pollution, particularly through the burning of stubble in harvested paddy crops.

- In many parts of the world, women and girls spend hours each day fetching water or waiting in crowded queues for water vendors, potentially increasing their risk of exposure to the virus. Conversely, lockdowns and curfews can limit access to water and sanitation.

- The International Energy Agency (IEA) estimates that overall global greenhouse gas (GHG) emissions will fall by as much as 8 per cent in 2020. However, they will increase again in line with the economic recovery, unless rebuilding better is translated into serious action. In this regard, monitoring CO_2 emissions while the economy is gaining traction will be one of the indicators of the success of a green recovery. The pandemic should not delay action to cut emissions because the climate crisis has already started. The 2019 UNEP Emissions Gap Report estimated that emissions will need to continue to fall by 7.6 per cent every year for the next 10 years to limit global warming to 1.5 C.

4. What we need to do: nine proposals for action

The global sustainable development agenda must promote the resilience and sustainability of food systems via a framework of policies and measures that (i) account for environmental thresholds and trade-offs; (ii) promote food security and healthy diets; (iii) enhance and protect rural livelihoods; and (iv) address the inequalities and injustices that have emerged during the crises and that will also prevail during a post-COVID transition. UNEP will play an important role in ensuring that rebuilding better does not lose sight of these important considerations. We propose the following nine measures:

- **Proposal 1 –** ***Aligning with global agreements:*** Wherever possible, international cooperation on achieving the SDGs must align emergency fiscal measures to prevent a global recession with the overarching goals of the SDGs and the Paris Agreement. Investments to recover economic development can yield multiple benefits in achieving global goals and agreements.

- **Proposal 2 –** ***Ensuring food security:*** Measures to mitigate the pandemic and promote economic recovery will only be successful when food security is guaranteed. Job losses and increased poverty reduce access to food. Social safety nets and food transportation networks that minimize loss and waste are needed, alongside simultaneous action to promote local food production.

- **Proposal 3 –** ***Labour supply:*** Action is needed to facilitate the movement of workers in the agrifood sector so that demands for their services can be better satisfied. This must take place in parallel with measures to prevent the spread of COVID-19 among farm workers and food processors by improving their working conditions.

- **Proposal 4 –** ***Do No Harm measurement and monitoring:*** At the very least, measures for the recovery should conform to a "do no harm" criterion and a prerequisite coordinated mechanism to measure and monitor the environmental impacts of COVID-19 recovery policies. Countries and international agencies must also assess the wider social and natural capital consequences of policy responses and the various fiscal stimulus packages. Advantage must be taken of opportunities for leapfrogging to green investments and promoting nature-based solutions to rebuild better. The effectiveness of recovery and stimulus packages should be measured against indicators for progress on the SDGs.

- **Proposal 5 –** ***Recognize that win–win opportunities exist and capture them:*** Natural capital investment in ecosystem resilience and regeneration, including restoration of carbon-rich habitats and climate-friendly agriculture, have been identified as having a long-run multiplier and highly positive impact on climate. Environmental

clean-ups, sustainable investment in agriculture, safeguarding natural resources and improving energy efficiency all have the potential for positive short-term stimulus effects, as well as environmental benefits in the longer run.

- **Proposal 6 –** ***Water:*** In developing countries, there is significant potential to improve the efficiency of existing water infrastructure, in terms of reducing illicit water extraction and incentivizing water-efficient agriculture. Water scarcity will negatively impact food security and create competition between different demands for water. COVID-19 has underlined the importance of clean water for sanitation. Access to water is also an equity/gender issue that must be addressed.

- **Proposal 7 –** ***Markets for meat:*** Steps must be taken to regulate animal trade to reduce the chances of a new pandemic, protect endangered species and support rural livelihoods.

Annie Spratt

- **Proposal 8 –** ***Using extant tools to apply a food systems approach:*** Evaluation tools such as the TEEBAgriFood Framework exist and have proof-of-concept. They should be used to ensure ecosystem services are valued, human and social capital is included in assessments, and a full value chain assessment is applied.

- **Proposal 9 –** ***A One Health approach:*** International agencies and member states should emerge from the crisis with an international implementation plan for One Health, an integrated approach that prevents and mitigates the threats at animal–human–plant–environment interfaces. This will address zoonotic threats and gender disparity within the agrifood system.

EXECUTIVE SUMMARY

INTRODUCTION

COVID-19 is an unprecedented global health and economic crisis that impacts the natural environment and curtails progress towards the Sustainable Development Goals (SDGs)[1,2]. Globally, millions have fallen ill and millions have lost their jobs and income. This report examines the effects of COVID-19 and the resulting recession on the agrifood system and its supporting ecosystems, including the related effects on air pollution, human health and climate change. In accordance with other recent United Nations Environment Programme (UNEP) publications and policy briefs, it makes recommendations for mitigating these impacts and rebuilding better.

The agrifood system is a key link between the biosphere and the way in which society and the economy function. The pandemic is likely to exert lasting damage to the fundamental determinants of long-term sustainable development through these connections. Despite uncertainties in the medium and long term, the current impact is clearly visible as governments around the world adopt drastic measures to respond to the worsening pandemic.

IMPACTS AND IMPLICATIONS OF THE PANDEMIC ON THE ECONOMY, THE ENVIRONMENT AND FOOD SYSTEMS

The negative economic effects of COVID-19 have been massive and the projections for the rest of 2020 are sobering. Contracting economic output (negative gross domestic product (GDP) growth) is particularly worrisome

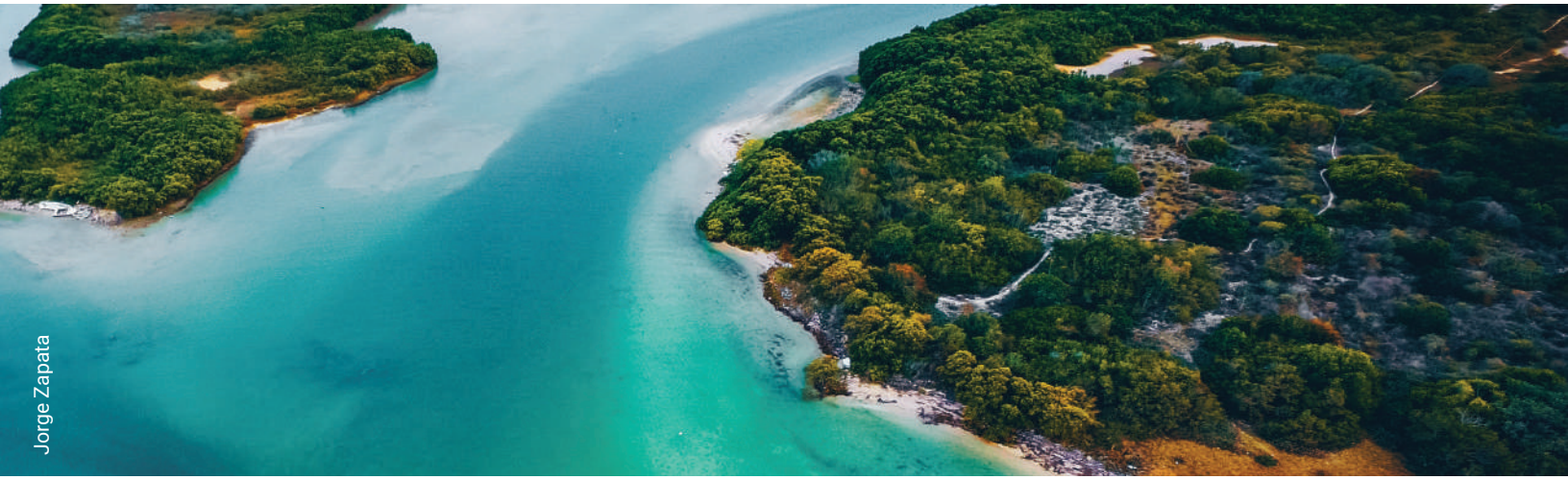
[1] The volume of reports and evidence on COVID-19 is staggering and evolving daily. The authors have attempted to synthesize, curate and assess this literature until August 2020, at which point the report was drafted and reviewed. The situation will have evolved between August and the date of publication and given the volume of evidence generated on a daily basis, the authors may have missed some literature. The authors have attempted to propose recommendations that remain relevant, but also recommend readers update themselves by reading the latest UNEP publications and those of our partners.

[2] For references please read the full report: https://www.unep.org/resources/report/covid19-environment-and-food-systems-contain-cope-and-rebuild-better

because it means higher levels of poverty, hunger, unemployment, and widening existing inequalities especially – but not only – in developing countries. The World Bank Global Economic Prospects indicate that the pandemic has led to the first global increase in extreme poverty since 1998, effectively wiping out progress made since 2017. Estimates also show that COVID-19 could push 71–100 million people into extreme poverty by 2020. The impact on hunger will also be striking: it is estimated that the number of people suffering from acute hunger could double from 135 million to 265 million by the end of the year.

At the time of publication, food prices globally have not risen on average and the projections show prices to remain stable. The central problem in most countries is not a food security crisis caused by rising prices but rather falling incomes. Nonetheless, this picture of stable global prices masks local price increases in a number of locations and the possibility of delayed disruptions to food supply chains.

The crises in donor countries caused by the pandemic – from the immediate health crisis to the deepening socioeconomic crises – are likely to drive overall reductions in global aid, despite increases in aid for the pandemic. Moreover, the shift in national budgets towards acute health demands could reduce support for environmental protection and agriculture, as has already been the case in some countries. The economic, health and social impacts of COVID-19 have direct and indirect links to ecosystems, biodiversity, pollution and climate change. COVID-19 also impacts the way agrifood systems can and will operate. These linkages are laid out in Table 2.


Jorge Zapata

Some key impacts are described below.

- The economic downturn is negatively affecting ecosystems where budgets are being cut for the management of protected areas and where the management of protected areas depends on revenue from tourism. The African Union has reported the postponement and, in some cases, outright cancellation of many sustainable forest management activities and has cited cases of increased poaching.

Deforestation of the Amazon has soared in recent months as South America battles the pandemic.

- Animal-to-human transmission is the source of 75 per cent of infectious diseases and evidence points to the biodiversity crisis as a contributory factor in the emergence of COVID-19. Both wild meat trafficking and intensive livestock rearing have been linked to the emergence and spread of zoonotic disease and both are significant drivers of biodiversity loss across the world. However, bans on the trade of wild meat could induce unemployment and poverty for thousands of women, who are the primary traders of wild meat, and undermine a valuable incentive for communities that protect wildlife.

- In various countries, the production of fruit and vegetables and meat and dairy products has been adversely affected by labour shortages caused by restrictions on the movement of labour and infections among food processors and farm workers.

- Reverse migration from cities to the countryside could harm indigenous communities and put pressure on biodiversity hotspots located in these areas. The pandemic may also exacerbate unregulated and unreported small-scale fishing.

- While air pollution has declined in many places during the pandemic, there is evidence that long-term exposure to poor-quality air exacerbates the severity of COVID-19 symptoms and increases the risk of fatalities. Increased exposure to poor indoor air quality, particularly high among women and young children who spend the most time inside the family home, may reduce resistance against COVID-19.

- Women, as guardians of household food and water security, are disproportionately affected by the impacts of the pandemic. In many parts of the world, women and girls spend hours each day fetching water or waiting in crowded queues for water vendors, potentially increasing their risk of exposure to the virus. Conversely, lockdowns and curfews can limit access to water and sanitation.

Jack Young

- Less demand for biofuels caused by less demand for transportation and lower oil prices has reduced the demand and prices for feed stocks. However, a surge in agricultural expansion and illegal mining has accelerated forest loss in Brazil and Colombia.

- Regarding climate change and greenhouse gas (GHG) emissions, the International Energy Agency (IEA) estimates that global GHG emissions will fall by as much as 8 per cent in 2020 due to contractions in travel, transport and energy demand. While this is a welcome impact, the 2019 UNEP Emissions Gap Report estimated that emissions must continue to fall by 7.6 per cent every year for the next 10 years to limit global warming to 1.5 C. Emissions in China, which accounts for one-quarter of the world's carbon emissions, already appears to have returned to pre-pandemic levels.

- Diet-related health conditions exacerbate mortality and morbidity among individuals infected with COVID-19. Non-communicable diseases (NCDs) such as diabetes, heart disease and obesity have been linked to increased rates of infection, hospitalization, intensive care admissions and death.

COPING STRATEGIES

The worst outcomes of the economic contraction and demand for health services can be partly mitigated through broad fiscal expansion to counter the pandemic. The global fiscal response to COVID-19 has been unprecedented: as of September 2020, governments have already provided about $11.7 trillion, equivalent to 13.9 per cent of global GDP. However, fiscal policy is constrained in some of the worst affected emerging markets and developing economies, where low tax bases and limited access to borrowing restrict the scope of government support, highlighting the need for access to additional resources and more efficient spending.

The bulk of fiscal support has taken the form of cash transfers and additional resources for health services. The International Monetary Fund (IMF) COVID-19 Policy Tracker contains very few examples of fiscal policies specifically targeting the agricultural sector and none targeting the environment. So far, green measures account for less than 0.2 per cent of total COVID stimulus spending allocated by the world's 50 largest economies.

SHORTCOMINGS

First, while immense resources are being devoted to tackling the crisis, there are areas where support is insufficient, particularly undernutrition and food insecurity.

Second, the support packages being implemented are very much concentrated on short-term relief. Given the limited fiscal resources of most developing countries, it is unclear how long they can continue. Moreover, very little fiscal stimulus has been provided for green-economy and nature-based solutions, despite evidence of their long-term benefits.

Third, there is a real concern that focusing resources on mitigating the acute impacts of COVID-19 could reduce resources for sustainable development in general, crowding out of important programmes targeting the SDGs in 2021 and beyond. A possible fall in official development assistance of $25 billion in 2021 has been flagged.

Fourth, the wide range of measures to support the agrifood sector – from emergency financial support to farmers to more structural support for local supply chains – are not always designed to ensure the right signals are sent to agents in the food sector that lead to long-term recovery. Moving forward, consistency and coherence between emergency relief and long-term objectives for sustainability, resilience and equity must be paramount.

Andrei Iasc

Lastly, the response measures have so far ignored linkages to the environment, including the need to prevent further loss and degradation of habitat, which facilitates the kind of animal-to-human transmission associated with the spread of zoonotic diseases such as COVID-19.

REQUIRED ACTION

Rather than following traditional international development approaches, the way forward must be global development that relies upon holistic analyses and identifies problematic dynamics between larger and smaller and richer and poorer countries. The importance of this fundamental shift cannot be overstated.

IMMEDIATE NEEDS

The current measures will need to be maintained and strengthened in areas where they are weak. Lack of income remains a problem and is preventing adequate access to food.

In the agrifood sector, the most pressing issues are ensuring supplies of inputs (including labour) and addressing difficulties in moving food around

inside countries. Even in Africa, a continent with a relatively high level of self-sufficiency, only a fifth of food consumed is grown by the families that eat it. Action is needed to improve networks for the transportation of food that minimize loss and waste, and simultaneously, local food production should be promoted.

A shortage of labour to work the land, given the restrictions on movement, will cripple food systems until resolved. Action is needed to facilitate the movement of workers in the agrifood sector. Measures must also be taken to prevent the spread of COVID-19 among farm workers and food processors.

These pressing issues are also important for the longer-term response. If measures to contain the virus fail then coping and building back will be much more demanding and impacts will be bigger and more costly.

SHORT-TERM NEEDS

As a priority during the next 12 months, countries must ensure relief and stimulus packages reach the most vulnerable people, which includes meeting the liquidity needs of small-scale food producers and rural businesses. Environmental clean-up, investment in sustainable agriculture, safeguarding natural resources and improving energy efficiency all generally have positive stimulus effects in the short run, as well as positive environmental effects in the longer run. Natural capital investments for ecosystem resilience and regeneration, including the restoration of carbon-rich habitats and climate-friendly agriculture, have also been identified as having long-run multiplier effects on output, in addition to a highly positive impact on climate. Studies have shown that improvements of 60–80 per cent in energy and water efficiency are technically possible and commercially viable in sectors like construction, agriculture, food, industry and transport. This has the potential to deliver annual cost savings of $2.9–3.7 trillion by 2030, based on $900 billion of investment and create 9–25 million new jobs.

Daniel Krueger

MID-TERM NEEDS

Specific attention must be paid to the aspects of the recovery that decouple economic growth from carbon emissions and biodiversity loss and not just to using resources more efficiently. While the COVID-19 recession may mean that governments are unable to compromise urgent economic priorities for the sake of sustainability, the careful design of low-carbon stimulus packages can allow them to address both sets of priorities at once.

There has been rapid adaptation to remote working, improvements in technology and an appreciation of the environmental benefits, with the potential to institutionalize and build on changes in behaviour. The extent to which behavioural adaptations become embedded after the crisis will be affected by policy choices during the recovery, as well as the extent and severity of lockdown measures. Mid-term measures can reinforce the work of governments and international agencies globally to promote the low-carbon transition, the move to sustainable food systems and other SDGs.

There are grounds for optimism in the medium term, given the strong support for change we have seen, including in the corporate sector. For example, 206 major firms, including major agrifood companies, wrote to the Government of the United Kingdom urging an economic recovery plan that prioritizes climate action.

However, countries must be mindful of the distributional effects of policies implemented in pursuit of a low-carbon economy. Measures that encourage working from home must be complemented with others to improve access to the required infrastructure. Investment in the food system should be guided by the results of life cycle assessments and economic impact analyses.

A SYSTEMIC APPROACH

Tackling these challenges requires a systemic approach. While food production has successfully increased to date, less progress has been made on reducing the negative environmental impacts of food systems. There is overwhelming evidence that the current way of producing food undermines its own ecological basis. The annual negative externalities of the food system have been estimated at $12 trillion, equivalent to around 8 per cent of global GDP in 2019. The COVID-19 recovery presents an opportunity to rebuild better, based on a holistic vision of the whole eco-agrifood system that encompasses social equity and jobs, as well as health and environmental impacts.

One opportunity is a proposal to emerge from the crises with an international implementation plan for One Health, an integrated approach that prevents and mitigates the threats at animal–human–plant–environment interfaces. It addresses key issues such as reducing the zoonotic risks posed by livestock and wild animals, reducing the consumption of meat where appropriate, reducing habitat and land-use change from agricultural conversion and improving environmental surveillance. Another opportunity is the United

Nations Food Systems Summit planned for September 2021. The summit will seek to raise global ambition, to understand the problems that must be solved and to set a course to radically transform our food systems.

Hennie Stander

In summary, the global sustainable development agenda must promote the resilience and sustainability of food systems through policies and measures that (i) account for environmental thresholds and trade-offs; (ii) promote food security and healthy diets; (iii) enhance and protect rural livelihoods; and (iv) address the inequalities and injustices that have emerged and will prevail during a post-COVID transition. UNEP will play an important role in ensuring that in rebuilding better we do not lose sight of these important considerations.

United Nations agencies must work together to implement this framework effectively by (a) monitoring the impacts of COVID-19 on environment and agrifood systems; (b) assessing the wider consequences for society and natural capital of policy responses as measured against SDG indicators; (c) helping capture opportunities for leap-frogging to green investments and promoting nature-based solutions to rebuild better; and (d) taking the lead in expanding the environmental dimensions of the One Health approach.

The importance of a quick and effective response to addressing the environmental challenges of COVID-19 and preventing a similar pandemic and crisis from happening again is clear from this report. Preliminary figures suggest that the cost of preventing further pandemics over the next decade by protecting wildlife and forests would be just 2 per cent of the estimated financial damage caused by COVID-19. Prevention is always better than cure.

I. INTRODUCTION

COVID-19 presents an unprecedented global health and economic crisis. Since detection of the virus at the end of 2019, it has caused around 30 million infections and more than 1 million deaths.

All around the world, millions of people have lost their jobs and their income in the deepest economic downturn in living memory. The health impacts include both the direct consequences of infection and the effects of measures taken to contain and mitigate the outbreak, including increased poverty, hunger, undernutrition and social disruption. These have not yet been fully understood or quantified. However, we know enough to confirm that **the combination of economic and health effects is impacting – and will continue to impact – our relationship with the environment and is curtailing the prospects for achieving the Sustainable Development Goals (SDGs).**

The United Nations Environment Programme (UNEP) has produced a series of reports on rebuilding better. See: Building a Greener Recovery: Lessons from the great recession (UNEP 2020); Building resilient societies after the COVID-19 (UNEP International Resource Panel [IRP] n.d.); Human rights, the environment and COVID-19 key messages (UNEP 2020a); Preventing the next pandemic: Zoonotic diseases and how to break the chain of transmission (UNEP and International Livestock Research Institute [ILRI] 2020). This report evaluates the effects of COVID-19 on all aspects of the environment, with a focus on interconnections between the pandemic and the agrifood system. Like these related UNEP publications, this report provides evidence, perspectives and recommendations on opportunities to sustain livelihoods while improving nature, climate and pollution outcomes. It complements these reports with a specific focus on the agrifood sector.

The food system exemplifies the way in which society, the economy and the biosphere are connected. These connections are undoubtedly being affected by the pandemic, and is likely to cause lasting damage to the fundamental determinants of long-term sustainable development. As of July 2020, we still do not know how long the outbreak will last, if a second wave will appear

in 2021 and when or for whom a vaccine will be available. However, many troubling effects are already clear. Despite uncertainties in the medium and long term, the impact is clearly visible today as governments throughout the world adopt drastic measures to respond to the worsening pandemic.

Prior to COVID-19, the case for systemic change in our food systems was clear and gathering momentum as members states, the United Nations, and academia drew attention to the role played by food systems – both positive and negative – in achieving the SDGs. More than any other sector, the agrifood system entails a web of feedbacks between ecosystems, livelihoods, economic development, trade relations and human health. This means it can support or hinder progress towards many of the 17 SDGs, such as Zero Hunger (2), Good Health and Well-Being (3), Gender Equality (5), Decent Work and Economic Growth (8) and Climate Action (13). Food production is a leading driver of biodiversity loss and a major contributor to greenhouse gas (GHG) emissions (PBL Netherlands Environmental Assessment Agency 2014; Mbow *et al.* 2019). The food and agriculture sector employs over a billion people throughout the world (Food and Agriculture Organization of the United Nations [FAO] 2012, p. 18). Food systems are the backbone of human health and also contribute to some of our fastest growing health problems – non-communicable diseases (NCDs) such as diabetes, obesity related cancers and heart disease (World Cancer Research Fund International 2014; Anand *et al.* 2015; FAO 2016).

Annie Spratt

READERS' GUIDE

The report starts with a wider perspective and then narrows down.

Section II lays out the *broader socioeconomic impacts of COVID-19,* including those related to measures taken to alleviate the negative effects of the pandemic. This is done at a global level and is complemented by a focus on developing countries. Section II is not focused on food systems impacts in their own right but provides the broad macroeconomic and political context. Readers familiar with this context may choose to skip to section III.

Section III examines *implications for the food system and food security outcomes,* including food prices, without considering the impacts on the natural environment, which is done in section IV.

Section IV focuses on the *nexus between COVID-19 macroeconomic responses, food systems and environmental impacts*. The framing for this assessment follows that of the draft Medium-Term Strategy for UNEP (2022–2025), which maps interventions to impacts on (i) nature/biodiversity; (ii) climate change; and (iii) pollution.

Section V turns to what governments *are doing* in their responses and section VI describes *what we have learned* so far from government responses.

Sections VII and VIII contain proposals and recommendations for what governments and international agencies *should be doing,* in the short term (VII) and the medium term (VIII). Overall conclusions are provided in section IX.

II. MACROECONOMIC IMPACTS OF THE COVID-19 CRISIS

This chapter summarizes the economic and social impacts of COVID-19, including impacts of measures to alleviate the pandemic, and examines their global implications as well as implications for developing countries.

It also examines projections for economic growth, employment and prices. It does not focus on food systems and food security in their own right – these are the subject of section III.

GDP GROWTH, UNEMPLOYMENT AND INFLATION

The negative economic effects of COVID-19 and the measures taken to fight the pandemic have been massive and the projections for the rest of 2020 are sobering. The prospects for 2021 indicate some progress but there are differences of opinion in the rate of recovery and varying estimates of the increases in poverty, unemployment and hunger. Much depends on what path the pandemic takes, which is by no means clear. At the national, regional and global levels, gross domestic product (GDP) is the main indicator tracked and forecasted by development banks. While it is by no means a measure of sustainable well-being, it tracks economic activity, whose changes are closely linked to poverty and unemployment. Table 1 shows the forecasts of three major international organizations: the International Monetary Fund (IMF), the World Bank and the Organisation for Economic Co-operation and Development (OECD). It is clear that, as new data become available, projections are becoming increasingly pessimistic. The data and commentary below relate to reports available at the time of writing (July 2020).

The IMF makes a single set of projections for GDP growth, with global output declining by 4.9 per cent in 2020 but rising 5.4 per cent in 2021 (International Monetary Fund [IMF] 2020). The World Bank is about 1 to 2 percentage points more pessimistic in its baseline scenario. The organization considers two scenarios: a "Downside", where an additional three months of stringent

lockdown are needed and an "Upside", with measures lifted by the end of quarter 2 of 2020. As Table 1 shows, under the downside scenario, global GDP contracts 8 per cent in 2020 and grows by just 1.3 per cent in 2021; under the upside scenario, global economic growth falls by 4 per cent in 2020 and recovers to growth of 5 per cent in 2021.

Table 1: Projected growth rates in GDP with the COVID-19 pandemic (percentage change)

COUNTRIES:	Advanced		Emerging & Developing		World	
	2020	*2021*	*2020*	*2021*	*2020*	*2021*
IMF	-6.1	4.5	-1.0	6.6	-3.0	5.8
World Bank Upside	-7.0	3.9	-2.5	4.6	-5.2	4.2
World Bank Downside	-10.0	1.2	-5.0	2.7	-8.0	1.3
OECD SI	-7.5	4.8	-4.6	5.6	-6.0	5.2
OECD SII	-9.3	2.2	-6.1	3.2	-7.6	2.8

Sources: IMF 2020; Organisation for Economic Co-operation and Development (OECD) 2020a; World Bank 2020a.

The OECD makes two projections, one in which there is a second wave of infections, with renewed lockdowns hitting before end of 2020 (SII); and another in which a major outbreak is avoided (SI). Under the more pessimistic scenario (SII), the global economy is estimated to contract 7.6 per cent in 2020 and grow by 2.8 per cent in 2021. Under the single outbreak scenario (SI), the contraction in 2020 is 6.0 per cent, followed by growth of 5.2 per cent in 2021. As such, the OECD is generally more pessimistic than the IMF, particularly under Scenario II and for emerging and developing economies.[3]

Regional development banks have similar projections for GDP, albeit with wider ranges, with larger losses in some cases and smaller losses in others. The African Development Bank expects the continent's GDP to fall by between $22 and $83 billion in 2020 (African Development Bank Group 2020), compared to $43 billion (upside case) and $86 billion downside case) in the World Bank report. The Asian Development Bank projects a global decline in GDP between 6.4 per cent and 9.7 per cent in 2020, with Asia (excluding China) facing a drop in the range of 4.6 per cent to 7.2 per cent and China facing a drop in the range of 7.5 per cent to 11.2 per cent (Asian Development Bank 2020). The Asian Development Bank's figures are much more pessimistic than the World Bank, which estimates an increase in GDP of 1 per cent in China and a contraction of 1.2 per cent for Asia (excluding China). The Inter-American Development Bank is forecasting a fall of between 1.8 per cent and 5.5 per cent in Latin America and the Caribbean (Inter-American Development Bank 2020), compared to the World Bank base case of 7.2 per cent.

[3] The actual terms for the country groups used in the two forecasts are different. The IMF and World Bank refer to advanced economies and emerging and developing economies while the OECD refers to OECD countries and non-OECD. The two sets, however, are very similar.

The IMF and World Bank project higher levels of unemployment but little overall inflation for the next two years. The OECD has not yet provided inflation figures but does give estimates of unemployment, which is projected to double in OECD countries under Scenario I and almost double under Scenario II, compared to figures for 2019. Figures for selected non-OECD countries such as Brazil, Russia and South Africa also show sustained increases in unemployment for both 2020 and 2021. Although unemployment data is not given for most developing countries, **contracting economic output (negative GDP growth) is particularly worrisome because of the large number of young people entering the labour force, which implies a need for growth in output to employ the growing number of workers.**

While these forecasts are concentrated on this year and the next, the economic consequences of COVID-19 will remain with us for some time. As the World Bank notes, "beyond its short-term impact, deep recessions triggered by the pandemic are likely to leave lasting scars through multiple channels, including lower investment; erosion of the human capital of the unemployed; and a retreat from global trade and supply linkages. These effects may lower potential growth and labour productivity in the longer term" (World Bank 2020a, p. xvl). One channel of impact is the real interest rate (net of inflation), which has been shown to drop after events that result in major loss of life. Data from past epidemics show that these rates can be associated with a period of persistent stagnation, with high savings relative to investment (Jordà, Singh and Taylor 2020). A computable general equilibrium (CGE) model developed to assess the impact of the pandemic in sub-Saharan Africa based on past experiences of similar crises (notably the 2014 Western Africa Ebola crisis) has found that COVID-19 is likely to have a lasting impact on labour productivity due to its adverse effect on human capital and infrastructure (Djiofack, Dudu and Zeufack 2020).

Hu Chen

In the best case, with the disease rapidly contained, the authors estimate the GDP of Africa will be permanently 1 per cent lower; in the catastrophic scenario, where the crisis lasts more than 18 months, it will be 4 per cent lower for more than a decade. This study does not take into account all the effects on labour productivity, meaning the full effect is expected to be even greater.

However, these pessimistic projections can be mitigated through broad fiscal expansion to counter the pandemic. This measure has the potential to boost public debt, reduce the national savings rate and possibly create upward pressure on real interest rates. It can also be affected by targeted green growth policies to increase investment, labour parity and productivity, and to prevent the degradation of natural capital while supporting human and social capital. Options for such pro-environment policies are discussed in section VII and VIII.

COMMODITY PRICES AND OUTPUTS

The deterioration in the global economic outlook and the breakdown of the OPEC+ agreement among oil suppliers have caused commodity prices to fall.[4] According to the IMF, base metal prices fell about 15 per cent in the first half of 2020, natural gas prices by 38 per cent and crude oil prices by about 65 per cent (IMF 2020). Futures markets indicate that oil prices will remain below $45 a barrel through to 2023, almost 25 per cent lower than the 2019 average, which reflects persistently weak demand. These developments weigh heavily on oil exporting states with undiversified revenues and exports (particularly high-cost oil producers) and compound the shock from COVID-19 infections, tighter global financial conditions and weaker external demand. At the same time, lower oil prices will benefit oil-importing countries and will reduce manufacturing and transportation costs. **The IMF projection is for an overall drop of 42 per cent in oil prices for 2020, 15 per cent for metals and 2 per cent for food.** In 2021, it projects oil prices to increase by 6 per cent, with a further fall of 6 per cent in metals and a small increase of 0.4 per cent for food. The World Bank has similar projections for oil and metal prices and expects agricultural prices to remain stable in 2020 and 2021.

CHAPTER SUMMARY

Despite wide variance in projected economic impacts, it is certain that the COVID-19 pandemic will reduce economic growth globally, reduce job creation and increase poverty, at a magnitude without precedent. The economic impacts will have implications for national budgets and development, impacting social safety nets, food security, food systems, environmental protections and complicating progress towards all SDGs.

[4] Organization of the Petroleum Exporting Countries (OPEC) plus Russia and other non-OPEC oil exporters.

III. IMPACTS OF THE COVID-19 CRISIS ON FOOD SECURITY

This chapter examines the implications of the crisis for the agrifood system, specifically the impact on progress towards SDGs 1 and 2 (No Poverty and Zero Hunger).

POVERTY AND HUNGER

Over the last few months, people in all countries have experienced the impact of COVID-19 in their daily lives. The pandemic has brought death, severe illness, job losses and increased poverty. For many, access to food has become a serious problem. This situation is likely to continue for some time and we cannot rule out further deterioration, especially in countries where the virus is still spreading. The consequences for developing countries are severe, with development funds diverted to deal with the epidemic. Lost income due to sickness and containment measures put in place by governments have had an immediate impact on purchasing power. Lockdowns and restrictions on movement have drastically reduced the number of jobs and income earned, as well as having had an immediate effect on remittances from migrant workers. Remittances are an important source of income for many families and their reduction can worsen living conditions. However, the problems of poverty and hunger are not only confined to developing countries: they also affect people who are living in poverty and situations of vulnerability in industrialized countries. The magnitude of the impact depends on the existing social security safety nets and the willingness and ability of governments to invest in improved social security systems. For countries with insufficient security nets, philanthropic organizations and informal networks play a major role in supporting people in need.

Estimates of people being pulled into poverty vary depending on the poverty line used. They range from 48 million for a poverty line of $1.9 per day for all countries to 135 million for poverty lines of $1.9 per day for low-income countries, $3.2 for middle-income countries and $5.5 for upper middle-income countries (International Bank for Reconstruction and Development and World Bank 2020).

These estimates were made in May 2020, when the epicentre of the pandemic shifted to the Global South. There are indications that cases in developing countries will rise sharply (Schellekens and Sourrouille 2020). At the time of writing, cases are surging in India and South America, inducing longer shutdowns and increased economic costs. As a result, the World Bank revised its estimate: the June 2020 Global Economic Prospects report found that, compared with pre-crisis forecasts, **COVID-19 could push 71 million people into extreme poverty in 2020 under the baseline scenario and 100 million under the downside scenario.** This implies that global extreme poverty would increase from 8.23 per cent in 2019 to 8.82 per cent under the baseline scenario and to 9.18 per cent under the downside scenario. **This would be the first increase in global extreme poverty since 1998 and would effectively wipe out progress made since 2017.** While a small decline in poverty is expected in 2021 under the baseline scenario, projected impacts are likely to be long-lasting (World Bank 2020b). Even before the pandemic, it was increasingly unlikely that the SDG of reducing extreme poverty to 3 per cent of the global population over the next decade would be achieved (World Bank 2018) . The pandemic puts this goal even further out of reach. Household incomes are expected to be weighed down by a sharp reduction in employment opportunities, lost earnings due to illness and the fall in remittances.

At the same time, many people are unable to feed themselves adequately. The World Food Programme (WFP) estimates **the number of people suffering from acute hunger throughout the world could double from 135 million at present to 265 million by the end of the year** (World Food Programme [WFP] 2020). Children are particularly vulnerable to a lack of adequate nutrition. An analysis by Lancet found that as many as 6.5 million more children under 5 years of age could suffer from wasting (low weight relative to their height) during the first year of the pandemic, an increase of 14.3 per cent. Without appropriate action being taken, this could result in an additional 10,000 deaths per month (Headey *et al*. 2020). UNICEF has an online dashboard that collates data from 85 countries to show their performance for different child welfare parameters. It shows that a large number of countries have experienced drops in nutrition programmes for adolescent girls and boys, as well as in nutrition programmes for schoolchildren (United Nations Children's Fund [UNICEF] 2020). There are also vulnerable groups in developed countries that are facing unprecedented food insecurity, even in the world's wealthiest cities (Patrick 2020). A report by Oxfam clearly shows the extent of the impact on hunger, **estimating there could be more deaths from hunger than from COVID-19** (Oxfam Australia 2020).

A report by the Food and Agriculture Organization of the United Nations (FAO) highlights that **as guardians of household food security, women are also disproportionately affected by the impacts of the pandemic.** Women who live in rural areas are an integral part of the agrifood value chain. In most countries, women lead agriculture and related activities, which makes them more vulnerable to the pandemic than men. There is evidence of this phenomenon in previous epidemics, such as Ebola and Middle East Respiratory Syndrome. These diseases have the potential to seriously undermine the empowerment

of these women, making gender-disaggregated data, gender-sensitive social security nets and awareness of the gender impact of policy responses vital (FAO 2020a).

GLOBAL FOOD PRICES AND OUTPUT

As noted, at the time of writing (July 2020), **average food prices had not risen during the pandemic and were projected to remain stable.** However, this global picture masks local price increases in a number of locations and does not take into account the possibility of delayed disruptions to food supply chains. The International Food Policy Research Institute (IFPRI) has launched a COVID-19 food price monitor that tracks pressure on food prices, which is mostly downward despite some exceptions (Food Security Portal 2020). For example, potato prices in India have increased more than 15 per cent and rice prices have also risen in some markets. In Uganda, prices of maize, millet and wheat have gone up more than 15 per cent and some commodity prices have increased in Rwanda and Burundi, the two other countries in Africa that are monitored.

Radoslav Bali

A number of factors have been identified as the causes of **local price rises.** Some **supply chains are being negatively impacted by a lack of workers and transportation**, such as meat processing (Schmidhuber, Pound and Qiao 2020) and dairy (Minten *et al*. 2020). There are reports that prohibitions on the migration of seasonal farm workers are also impacting crop prices (Gonzalez and Aronczyk 2020; Schmitz 2020). In some places, global supply chains have broken down and while local supply chains are reorganizing to accommodate this phenomenon, there has been upward pressure on prices in some cases (FAO 2020b; The Economist 2020). Furthermore, as of April 2020, 17 countries had introduced export restrictions on food items (World Trade Organization [WTO] 2020). While this is a relatively small number compared to previous crises, it will nonetheless impact food prices locally, particularly in countries heavily dependent on food imports, such as the small island developing states (Tableau Public 2020).[5]

[5] According to IFPRI, during the crisis of 2007-08 export restrictions blocked about 11 per cent of the calories that flowed through global markets. In this pandemic similar measures have affected only 3 per cent of supplies but there are signs that the number is going up. See: http://sdg.iisd.org/commentary/guest-articles/covid-19-measures-in-spotlight-at-wto-meeting-on-agriculture/.

Despite the pandemic, **global food stockpiles are healthy.** FAO estimates that global cereal production in 2020 will be 2.7 per cent above the record set the previous year, improving the stock-to-use ratio. The FAO highlights that while global wheat production can be expected to fall slightly, inventories could still be pushed up due to the dampening effect of COVID on demand. Global rice production is also expected to recover with better stock utilization rates (FAO 2020c).

So far, **the problem in most countries appears not to be a food security crisis induced by food prices going up but rather incomes going down** (Schmidhuber, Pound and Qiao 2020). The increase in unemployment and poverty referred to above reduces spending on food and raises the level of hunger and undernutrition. At the same time, there are warnings that supply factors could worsen due to falling investment, labour growth and other aspects of supply chain logistics (Goel, Saunoris and Goel 2020). The spread of COVID-19 in slaughterhouses – not from meat itself but from the working and living conditions – is particularly important (Science Media Centre 2020). More generally, restrictions on movement enacted to prevent the spread of the virus are starting to disrupt the supply of agrifood products to markets and consumers, both within and across borders (OECD 2020b). How this impacts the wider community will depend on national policy responses.

CHAPTER SUMMARY

Sickness, restrictions on movement and loss of income have increased unemployment, hunger and poverty globally. The initial impacts of the pandemic affected developed countries more severely. It had a significant effect on service workers in these countries, with many jobs disrupted or eliminated, particularly among immigrants, for whom the problem was compounded by the lack of access to unemployment benefits. This has caused a dramatic fall in remittances. Women have been disproportionately affected. The impacts have since shifted to middle-income countries, such as Brazil, India and Mexico. Although purchasing power has declined, so far global food stocks have remained relatively stable. However, disruptions to production, processing and distribution, which have a delayed impact on food availability, are causing some local price increases

IV. ASSESSING THE IMPACTS OF THE COVID-19 CRISIS ON THE NEXUS BETWEEN AGRIFOOD SYSTEMS AND THE ENVIRONMENT

This chapter explains the many connections between the pandemic, the environment and food systems, providing examples of specific impacts on ecosystems, biodiversity, human health and sustainability.

The economic, health and social impacts of COVID-19 have direct and indirect links to the natural environment and to the way agrifood systems are organized. The UNEP COVID-19 updates list a number of impacts on the environment, such as the spike in use of single-use plastics, reduced ecotourism and reduced marine tourism. They also discuss opportunities to mitigate climate change and new risks arising from the pandemic with the potential to accelerate climate change. Similarly, they draw attention to the role of habitat destruction on the propagation of zoonotic diseases such as COVID-19 and the threat facing agriculture sectors, such as rice production, which are being further damaged by the effects of the pandemic.

Table 2 details the complex ways in which food systems and nature are being – and will continue to be – affected by COVID-19 and the measures taken to contain it. It identifies three categories of environmental impacts: ecosystems and biodiversity; air, water and land pollution; and climate change. The main channels by which these categories are impacted are through the economic, health and social effects of COVID-19. Many environmental impacts – both positive and negative – are related to the economic contraction: on the one hand, less economic activity may reduce pollution and emissions; on the other, shrinking budgets may curtail investment in sustainability and conservation and poverty may increase pressure on natural resources.

This chapter elaborates on the three sets of environmental impacts identified in table 2. In each case, the review begins with the economic links, before considering health and social impacts.

COVID-19 RELATED IMPACTS ON FOOD SYSTEMS AND NATURE

	Ecosystems and biodiversity	Pollution	Climate change
Economic impacts	Less funds for enforcement: evidence of increase in poaching, fly tipping, etc. (-)	Less funds to ensure compliance with waste disposal (-)	Less funds to ensure compliance on climate-smart agriculture (-)
	Falling incomes reduce pressure on commercial capture fisheries (+)	Lower prices for inputs such as fertilizer, but may lead to overuse (+/-)	Less biofuel demand lowering forest clearance- related emissions (+)
	Unemployment increases pressure on subsistence fisheries and wild food products (-)	Less work absenteeism due to lower local pollutants (+)	More land clearance to increase provision of food as a result of higher self-sufficiency (-)
	Less biofuel demand reduces pressure for forest clearance and habitat loss (+)		Lower emissions due to lower activity (+)
	More land clearing to increase provision of food to replace wild meat in some places but more hunting of wildlife in others (+/-)		Emissions impacts during recovery phase depend on nature of fiscal stimulus (+/-)
Health-related impacts	Diet shifts due to lower incomes (?)	Diet shifts due to lower incomes (?)	Diet shifts due to lower incomes (?)
	Labour shortages reduce crop and livestock productivity, reducing food availability (-)	Higher mortality rates from COVID-19 in areas where pollution levels are high (-); but lower pollution levels due to lower activity (+)	Lasting shift in production and consumption patterns (?)
	Less human resources to manage land (-)	Indoor air pollution worsens as people, primarily women and children, spend more time indoors (-)	
	Greater control of use of wildlife in some places (+); less control and more use in others (-)	Restrictions on movement making access to sanitation and safe water more difficult (-)	
Social impacts	Increased pressure on common resources as workers return from urban areas and from overseas (-)	Possibility of changing use of transport for work and social reasons over the long term with lower local air emissions (+)	Lower GHG emissions under travel restrictions (+); higher emissions due to reduced mass-transit use (-)
	Increased pressure on land as workers return from urban areas and from overseas (-)		Possible long-term changes in travel/transport for all uses, with lower GHG emissions (+)

(+) Indicates that the evidence suggests a positive impact on the economy, health or society; (-) indicates a negative impact; (?) indicates there is no evidence.

ECOSYSTEMS AND BIODIVERSITY

The economic downturn is hurting ecosystems where budgets for the management of protected areas are being cut. Due to limited monitoring of these protected areas and limited revenue from tourism the incidence of poaching is increasing in several countries, such as India (Saeed *et al*. 2020), as well as some countries in Africa (Roth 2020) and South-East Asia (Briggs 2020). A UNEP COVID-19 update (UNEP 2020b) details the decline in revenue from great ape tourism in Rwanda, which has been halted due to fears that humans could transmit the virus to the animals. This has even affected areas without great apes, cutting off their source of income. Many protected areas use the income generated from tourism to fund law enforcement, biomonitoring and staff salaries. Several months without tourism revenue has pushed many protected areas into a financial crisis. The release of staff and the suspension of law enforcement can easily lead to an increase in poaching and encroachment, firstly because there is little law enforcement, and secondly because community members have lost their income and have few other alternatives (Lindsey *et al.* 2020). Primate sanctuaries and rescue centres are also affected. Despite being closed to tourism, animals must still be fed and operations cannot simply be stopped. All these developments have a negative effect on activities associated with the green economy.

The problems are not confined to protected areas controlled or managed by the state but extend to community-managed areas, where the effects could be even more severe as they often have no state/tax revenue (Lindsey *et al.* 2020). Populations that depend on these areas are being hit hard: workers are losing their jobs and often turn to natural resources to meet food needs, as well as the sale of natural products. Behavioural changes in the very communities that were protecting wildlife and engaged in its conservation may become part of the problem if alternatives are not found. There have been some signs that wild animal hunting has increased to fill gaps in income and the availability of meat (Sathishkumar and Rajan 2020). Meanwhile, there are a growing number of calls to ban the trade and consumption of wildlife globally because of evidence that suggests COVID-19 originated in wild bats (Global Wildlife Conservation 2020).

Dubcey Lima

However, as a UNEP COVID-19 report explains, the links between wildlife, health, gender equality and the environment are complex (UNEP and ILRI 2020). Bans could have unintended consequences for rural communities. The implications of wild meat bans are discussed in section V and recommendations for action are made in section VI.

An African Union policy brief (African Union 2020) reports the postponement and in some cases outright cancellation of many sustainable forest management activities. It also notes that lockdowns will **increase wildlife poaching.** Many wildlife management authorities in Africa are semi-autonomous, largely relying on revenue from the tourism industry. However, an unprecedented decline in the number of international visitors is causing revenue to dry up. Many wildlife trusts will lose significant funding, further pushing communities into protected areas in search of livelihoods. Another concern is that forest products in Africa will be seen as a means of recovery from the economic downturn created by COVID-19. Governments may resort to licensing large-scale commercial timber interests to raise the desperately needed financial resources to support socioeconomic development after the pandemic.

Deforestation of the Amazon has soared in recent months as South America battles the pandemic. In April, 405 square kilometres of rainforest wilderness was razed, an area almost four times the size of Paris. The Brazil space research agency reports this to be an increase of 64 per cent from April 2019 (Pedroso and Darlington 2020). Furthermore, the decline in demand for biofuels, which would be expected to translate into lower pressure on forest clearance has not materialized. Deforestation further impacts indigenous people living in those areas, where there is poor access to health care facilities, especially for indigenous women seeking access to sexual and reproductive services, the elderly and for those with underlying illnesses.

Despite all these negative effects, there are also some positives. In Outamba Kilimi National Park, Sierra Leone, the rate of illegal timber harvesting has plummeted to zero, due to the drop in international demand. However, this situation must be carefully monitored, since local enterprises may take advantage of the lull to restock their timber yards with illegal logs in anticipation of the end of the pandemic (Inveen 2020).

OTHER EVIDENCE OF HOW ECOSYSTEMS (ESPECIALLY THOSE PROVIDING FOOD CROPS AND LIVESTOCK) ARE BEING IMPACTED BY COVID-19

Reduced biofuel demand

Less demand for biofuels due to falling demand for transportation and lower oil prices has reduced demand and prices of feed stocks (Schmidhuber and Qiao 2020). So far, there is no evidence that this has changed the pressure on forest clearance but the question of what happens to land that was used for biofuel production merits further investigation.

Rice production

United Nations organizations have highlighted the adverse effect of COVID-19 on rice production and exports (FAO 2020d; UNEP 2020c). Pandemic-induced panic buying has encouraged some rice exporting countries to impose bans on exports, which has affected importing countries. In April, for instance, a ban by India on exporting basmati rice impacted the United Arab Emirates and other Gulf states which receive a large amount of their staple grain from India, forcing them to look for alternative sources. Meanwhile, extended lockdowns in major rice producing countries have delayed the acquisition of inputs like fertilizers and seeds by local farmers. Restrictions on the movement of farm labourers could affect planting and harvesting, reducing future yields. These supply disruptions will increase prices. Price surges disproportionately harm poorer households, for which rice is a staple and accounts for a significant proportion of monthly spending.

Commercial and subsistence fisheries

Fisheries have also suffered mixed impacts from the pandemic. A drop in demand has hurt commercial fisheries but may improve wild fish stocks in the short term (FAO 2020e). Commercial fisheries may also suffer labour shortages and transportation disruption. Studies show that in island countries and coastal areas, people who are unemployed may turn to fishing for food and income, increasing pressure on near-shore fish stocks. The pandemic may also exacerbate unregulated and unreported small-scale fishing in some areas, while in other areas the drop in demand may increase poverty in fishing communities (Bennet and Robinson 2020).

Migration (especially to sensitive areas)

Thousands of tribal migrant workers have lost their livelihoods in India due to the nationwide lockdown and are on their way to their villages. Such reverse migration could destroy indigenous communities in tribal territories (Mohanty 2020). These tribal areas are among the best-conserved territories in terms of biodiversity and natural resources. This migration and the ensuing spread of disease compromise the viability of communities and the natural environment.

POLLUTION

COVID-19 has been linked to harmful emissions in air, water and the land. Although these impacts do not directly implicate agriculture or food systems, they have important economic, health and social consequences. They also point to potential measures that can be applied in the agricultural sector and for food systems as part of rebuilding better, as discussed in subsequent chapters.

Air emissions

Emissions of nitrogen dioxide (NO_X) and particulate matter (PM) have declined notably across many countries (Berman 2020). NO_X satellite measurements of air quality for China, South Korea, Italy, Spain, France, Germany, Iran, and

the United States (the epicentres of the virus) all show reductions in NO_X: in urban areas of China, the decline was 40 per cent; in Belgium and Germany, it was 20 per cent; and the reduction ranged from 19 per cent to 40 per cent in different US states. There was no decrease in NO_X in Iran (one of the countries most affected by COVID-19), which could be due to the country's less stringent lockdown (Bauwens *et al.* 2020). On PM, a study focused on China reported a 35 per cent reduction in PM2.5 (Shi and Bassuur 2020) while the reduction in India was estimated to be 43 per cent for PM2.5 and 16 per cent for NO_X (Sharma *et al.* 2020).

Robert Bye

However, similar reductions in PM concentrations have not been observed throughout the world. The European Environment Agency reports that although NO_X concentrations have declined across the continent, a consistent reduction has not yet been observed across European cities. This is likely due to the fact that the main sources of this pollutant are more varied. In Europe, they include the combustion of fuel for heating residential, commercial and institutional buildings, as well as industrial activities. A significant fraction of PM is also formed in the atmosphere from reactions of other air pollutants, including ammonia, which, in Europe is typically emitted by the application of agricultural fertilizers in the spring. An analysis of China noted that the decline in PM2.5 has been accompanied by an increase in concentrations of secondary pollutant surface ozone in the country of 150–200 per cent (Shi and Bassuur 2020). Similarly, ozone concentrations in India have increased by 16 per cent (Sharma *et al.* 2020). This increase is probably a direct consequence of the declines in NO_X on the presence of volatile organic compounds, since photochemical reactions between these two pollutants can result in higher ozone levels when NO_X concentrations decline.

Changes in emissions of these harmful pollutants could significantly reduce premature mortality and morbidity, as well as losses from absenteeism.[6] Links between concentrations of these pollutants and these health and work-related impacts at the global level are well documented (World Bank and Institute for Health Metrics and Evaluation 2016). However, there is not

[6] Given the reductions in output and demand for labor due to the virus, the effect on absenteeism will not be as important as it is under normal conditions.

yet any evaluation of the gains in terms of lives saved or reduced health and absenteeism costs associated with the current reductions. And at time of writing it is difficult to predict how PM concentration will continue to change over the coming year.

Another link between air pollution and the impacts of COVID-19 is the connection between hospitalization and death from the virus and higher concentrations of these pollutants. New research has found that long-term exposure to air pollution may be "one of the most important contributors to fatality caused by the COVID-19 virus" around the world (Ogen 2020). The study examined COVID-19 fatalities in four European countries that have been hit hard by the virus (Germany, France, Italy and Spain). It found that 78 per cent of deaths occurred in just five regions in northern Italy and Spain. These regions have the highest concentrations of nitrogen dioxide (NO_2), a pollutant harmful to human respiratory systems. Moreover, the geography of these regions mean they also suffer from downward air pressure, which can prevent the dispersal of airborne pollutants.

The findings of a recent study on the United States are similar: **an analysis of 3,080 counties found that even a small increase in long-term exposure to air pollution could have a significant impact on the severity of COVID-19 symptoms** (King 2020). It suggests that lowering the average amount of airborne PM in Manhattan by just one microgram over the past 20 years could have led to 248 fewer deaths from the disease so far.

Yoav Aziz

In addition to weakening our respiratory systems and making us more susceptible to COVID-19, air pollution might also be functioning as a vector for transmission for the virus. Scientists in Italy have detected coronavirus on particles of air pollution, which could, they believe, help the virus spread (Setti *et al*. 2020). However, it is important to note that these findings are preliminary.

The third link between COVID-19 and air quality relates to homes. The increase in the number of people remaining indoors as a result of the coronavirus pandemic makes managing indoor air pollution even more important.

In developing countries, there are also emissions from the combustion of wood and coal inside homes. The Stockholm Environment Institute notes that in many of these countries, COVID-19-related measures requiring people to stay indoors and at home could increase exposure to indoors emissions. For example, exposure to air pollution among members of households who spent more time at home and use coal for cooking in Accra, Ghana, was twice as high as members who spent more time outside (SEI 2020).

Globally, 3 billion people still cook using unclean fuels and technologies, which leads to household air pollution and further undermines their health. According to the World Health Organization (WHO), "3.8 million people a year die prematurely from illness attributable to the household air pollution caused by the inefficient use of solid fuels and kerosene for cooking." Exposure is particularly high among women and young children who spend the most time inside the family home, which further reduces their immunity against zoonotic diseases including COVID-19 (World Health Organization [WHO] 2018).

Reduced access to water

In many communities around the world, a lack of water supply and sanitation deprives people of their most basic protections against the spread of the virus. This means that where handwashing is limited and waterborne diseases are already common, not only will COVID-19 spread more easily, it could prove more lethal. This aspect is also related to gender (UNICEF 2016). In many parts of the world, women and girls spend hours every day fetching water or waiting in crowded queues for water vendors, potentially increasing their risk of exposure to the virus. Their health and consequently their food security could be further compromised if they struggle with these tasks because they are ill or have to care for people who are sick.

2photo Pots

CLIMATE CHANGE

GHG emissions

The International Energy Agency (IEA) estimates that global GHG emissions will fall by as much as 8 per cent in 2020 due to contractions in demand for travel, transport and energy (International Energy Agency [IEA] 2020a). The UNEP Emissions Gap Report in 2019 estimated that to limit global warming to 1.5 C, emissions would need to continue to fall by 7.6 per cent on average every year for the next 10 years (UNEP 2019). These figures show the scale of the challenge we face in order to reduce GHG emissions.

There is also some evidence of a rebound effect, whereby this fall may be reversed in the extremely short term, partly as fear of infection makes people avoid public transport and switch to private vehicles with higher per capita emissions (a trend already partly observed in China) and as lockdown restrictions are relaxed. In April, when most countries were in lockdown, fossil fuel emissions were 17 per cent lower in 2020 compared to the 2019 average (Le Quéré *et al*. 2020). However, the easing of restrictions has reduced this figure to just 5 per cent below the 2019 average and emissions in China have already rebounded to pre-pandemic levels (Integrated Carbon Observation System n.d.). As such, any fall in emissions due to the pandemic should be seen as temporary.

Dan Smedley

Emissions from deforestation and land clearing

The fall in travel should also reduce biofuel demand and thus the incentive to clear land for growing fuel crops. However, so far there has not been evidence to support this. As the CEO of Conservation International notes, "poaching and deforestation in the tropics have increased since COVID-19 restrictions came into force around the world, according to recent reports from Conservation International field offices", stressing that **"a surge in agricultural expansion and illegal mining has accelerated forest loss in Brazil and Colombia"** (Price 2020). Indeed, FAO has argued that COVID-19 could increase widespread forest loss (FAO 2020e). Monitoring agencies have speculated that this is due to the reduced presence of government, policing organizations and non-governmental organizations (NGOs) in areas prone to illegal logging (Fair

2020). The links between the pandemic and demand for land for food and fuel crops are complex and merit further investigation.

Compound human health impacts

Diet-related health conditions appear to increase the mortality and morbidity of people who become infected with COVID-19. Just as air pollution may worsen infection rates and symptoms, non-communicable diseases (NCDs) such as diabetes, heart disease and obesity have been linked to increased rates of infection, hospitalization, intensive care and death (Popkin *et al*. 2020). These compound morbidities are highlighted in this report because of the relationship between food systems and NCDs (Global Panel on Agriculture and Food Systems for Nutrition 2016; Branca *et al*. 2019). Poor access to nutritious foods and the availability of inexpensive, high-calorie foods are associated with an increasing prevalence of NCDs globally. Studies from Mexico, China and the United States have identified a connection between NCDs and the severity of COVID-19 infections (Azarpazhooh *et al*. 2020; Hernandez-Galdamez *et al*. 2020; Popkin *et al*. 2020). This evidence highlights the need to consider how food systems influence diets and obesity. It appears that healthier diets and the consequent lower incidence of NCDs could increase global resilience to COVID-19.

CHAPTER SUMMARY

Restrictions on movement and the loss of income have driven changes in human behaviour, impacting the environment and food systems in a variety of ways. Among the many impacts, this section has described those that lie at the nexus of food systems and the environment. Most notably, a fall in tourism revenue and redirected state budgets are reducing resources for conservation; lockdowns and unemployment are changing how people travel and patterns in the transportation of goods; and income loss is affecting how people obtain food and what they eat. These drivers, some of which require a gender analysis, have implications for ecosystems, biodiversity, pollution and our climate.

V. COPING STRATEGIES AND THEIR IMPACTS

This chapter summarizes global and national responses to the pandemic and provides examples of how the response has impacted food systems in many countries. It also summarizes the strengths and weaknesses of these response strategies.

RESPONSE BY NATIONAL MONETARY AND FISCAL AUTHORITIES

The fiscal and monetary stimulus provided by governments as part of the global response to the pandemic has been unprecedented. Globally, the level of fiscal stimulus stands at approximately $11.7 trillion as of September 2020, equivalent to nearly 14 per cent of global GDP (IMF 2020a). Fiscal support packages cover a wide range of measures that aim to replace lost household income and business revenues. They include easing or delaying payment obligations for taxes, utilities, rents and servicing debt (World Bank 2020a). As of June 2020, **the G20 countries were estimated to be providing $7.6 trillion in fiscal support, equivalent to 11.2 per cent of their combined GDP for 2019.** Moreover, $4.1 trillion of this sum has supported direct government spending (4.8 per cent of combined GDP), $2.6 trillion for credit enhancements and $0.8 trillion for tax relief (Segal and Gerstel 2020). Several central banks have also loosened their monetary policy in the wake of the pandemic (IMF n.d.). In most advanced economies, this has brought already low interest rates close to or below zero (OECD 2020c). Countries have also implemented extraordinary measures to ease tight credit markets by purchasing corporate debt. This approach follows in the footsteps of the financial crisis of 2008 and marks the second time major economic problems in the private sector have been tackled by a massive increase in public debt. It remains to be seen how the joint impact of this previous financial crisis and the additional financial support provided to mitigate the impact of the pandemic will change the global economic system.

As a key indicator of the seriousness of the challenge, the European Union is expected to change the fundamental architecture of its multiannual financial framework, with an increase in its budget of €750 billion to provide grants and credits to support member states. The joint-debt proposal by France and Germany calling for the creation of a €500 billion recovery fund, marks a milestone in the history of the European Union. Notwithstanding all the differences in some of the proposed measures, the debates among member states show that COVID-19 is seen as a fundamental threat not only to the financial stability of the bloc itself but also to its political future.

Policymakers in emerging market and developing economies (EMDEs) have also used a range of monetary and fiscal measures to respond to the pandemic. In terms of monetary policy, they have supported the flow of credit, with several central banks sharply lowering interest rates (IMF n.d.), and some complementing this measure with asset purchase programmes similar to those in advanced economies. In terms of fiscal policy, most EMDEs have announced fiscal policy support to confront the immediate health crisis and save lives, limit the scale of the economic contraction and accelerate the eventual recovery. At least three-quarters of EMDEs have increased funding for health care systems to expand testing and hospital capacity (IMF n.d.).

Adhy Savala

Fiscal support has targeted the expansion of the coverage of social protection, including wage subsidies to protect jobs, cash transfers to households and increased access to unemployment benefits. Measures have also been implemented to ensure continued access to critical public services for vulnerable groups, including low-income households and the elderly (Argentina, Indonesia, Pakistan, the Philippines and Russia). Lastly, several countries have supported strained food systems through subsidies for inputs and cash transfers for food purchases (ONE n.d.).

However, in some of the worst affected EMDEs, the fiscal response is constrained by an insufficient tax base and limited borrowing potential. This limits the scope of government support and highlights the need for access to additional resources and to make public spending more efficient. Many developing and low-income countries are likely to face fiscal constraints as a result of high existing debt-to-GDP ratios and the risk of inflationary pressure

(Institute of International Finance [IIF] 2020). India, for example, announced a 20 trillion rupee ($266 billion) relief package, which would be among the largest in the world. But analysists suggest the amount, roughly 10 per cent of the country's GDP, exaggerates the probable impact because much of the quoted sum will come as loan guarantees or as part of previously announced fiscal measures (Economic Times 2020).

RESPONSE BY INTERNATIONAL AGENCIES AND THROUGH AID TRANSFERS AND DEBT RELIEF

Specific funds for poor countries to address COVID-19 include:

- Lending of up to $150–160 billion from the World Bank, particularly for efforts to support vulnerable populations in client countries (World Bank 2020c).

- The IMF has doubled access to its urgent facilities (Rapid Credit Facility and Rapid Financing Instrument), allowing it to meet around $100 billion of demand for financing. These facilities allow it to provide emergency assistance without having a full programme in place. Financing has already been approved for nearly 60 countries. The IMF has also offered immediate relief for servicing debts to 29 countries under its revamped Catastrophe Containment and Relief Trust, as part of its response to help address the impact of the COVID-19 pandemic. The trust provides grants to the poorest and most vulnerable members of the IMF to cover debt obligations for an initial phase over the next six months, allowing them to channel more of their scarce financial resources towards vital emergency medical and relief efforts. The IMF is working to increase the value of the trust to $1.4 billion to provide two years of grant-based debt relief.

- The European Union will make €15 billion available to help poor countries (particularly those with weak health care) fight the coronavirus epidemic and assist with the long-term economic recovery (EURACTIV 2020).

- The G20 countries have agreed to suspend debt servicing on around $11 billion of official bilateral credit to poorer countries. The IMF, the World Bank and the G20 have also called for private-sector creditors to replicate this measure, which could add a further $7 billion of relief. Individual countries are also ramping up aid programmes for COVID-19. For example, the German parliament is currently debating an increase in its budget for development cooperation of around €3 billion.

- Almost $320 million has been committed by donors and contributors in response to a WHO appeal in April to support the response to COVID-19 in vulnerable countries (Center for Global Development 2020).

While the amounts involved are clearly substantial, they must be considered in the context of the size of the crisis and the impact it will have on international aid in general. It is probable that the impact in donor countries will drive overall reductions in global aid, despite increased relief aid for the pandemic. Furthermore, emergency support will also shift the focus away from other development programmes. Global official development assistance levels could drop sharply by around $25 billion by 2021, with the prospect of a protracted economic recession causing donors to reallocate their external budget to domestic spending and revival (Development Initiatives 2020). This would amount to about 16 per cent of total official development assistance for 2019. In other words, **spending in response to the pandemic may not result in additional net resources for developing countries.**

Similarly, shift in budgets towards acute health could see a reduction in support for environmental protection and agriculture. There is already some evidence of less funding for the environment (see section 2).

Furthermore, many investments have not been designed to address persistent underlying inequalities. In support of gender mainstreaming efforts in countries' responses, the United Nations Inter-Agency Network on Women and Gender Equality (IANGWE) has published guidelines for integrating gender equality in the implementation of the UN framework for the socioeconomic response to COVID-19 (United Nations Inter-Agency Network on Women and Gender Equality [IANGWE] 2020), and the United Nations Development Programme (UNDP) and UN-Women have published a COVID-19 Global Gender Response Tracker (UNDP and UN-Women 2020), which monitors policy measures enacted by governments worldwide to tackle the COVID-19 crisis, and highlights responses that have integrated a gender lens. The tracker, which is still a work-in-progress, shows that in July 2020, of the measures taken in response to COVID pandemic, 42 per cent are gender-sensitive.

SUPPORT FOR AGRICULTURE AND THE ENVIRONMENT IN RESPONSES TO COVID

As noted, the bulk of fiscal support has taken the form of cash transfers and additional resources for health services. The IMF Policy Tracker for COVID-19 cites a few examples of fiscal policies specifically targeting the agricultural sector but none focused on the environment (IMF n.d.). There have been several measures for the agrifood system in general but very few that pay attention to the environmental aspects of food production and consumption. Some examples of national **interventions to support agriculture and the environment in areas such as subsidies for agricultural inputs, support to develop local supply chains, measures to ensure smooth trade flows, emergency food imports, cash support programmes, food support programmes and environmental compliance measures** are detailed below.

Nandhu Kumar

Subsidies for agricultural inputs

In Ghana, when the Government saw the rice supply affected by restrictions imposed by exporting countries, it decided to support domestic rice production by providing a subsidy of 11,000 million tons of seed rice (ONE n.d.). In India, the national relief package includes the provision of 300 billion rupees ($4.5 billion) of additional emergency working capital funding for small and marginal farmers to meet post-harvest spring (Rabi) and current autumn (Kharif) requirements. Several countries, including Angola, Haiti, Kyrgyzstan, Liberia and Senegal, are providing similar financial assistance, supported in part by agencies like the World Bank to address the reduction in access to finance among farmers (World Bank 2020d).

Support to develop local supply chains

Transport problems have caused delays to the provision of inputs and migrant labour has become less accessible. In response, communities are developing local supply chains with some support from governments. In India, the Mayurbhanj District Administration launched the "Mayur fresh on wheels" initiative, with small vans delivering vegetables to people's houses with the slogan "Stay at home, eat safe". The initiative cuts out intermediaries by promoting farm-to-door delivery. India has also implemented the Farmers' Produce Trade and Commerce (Promotion & Facilitation) Ordinance 2020, which will promote barrier-free trade and commerce between and inside states of farm produce outside the physical premises of official markets.

In other countries, local initiatives are supporting direct market linkages between sellers and consumers. For example, vegetable supply bases around cities in China are ensuring smooth supplies of produce despite lockdowns (FAO 2020b). In Kenya, the World Bank is providing $1 billion through a development policy financing facility that will support significant reforms and deregulation in the agricultural sector. This includes facilities to allow farmers to buy inputs such as fertilizers and seeds electronically using vouchers on their mobile phones. However, the scheme has been criticized by advocates of local food systems for promoting the seeds and fertilizers of multinational companies at the expense of local supply chains (Mousseau and Currier 2020).

Freer movement of trade

These measures are in addition to others that seek to ensure global supply chains remain open and function efficiently. After some countries moved to restrict exports of food products (Tableau Public 2020), a powerful consortium of World Trade Organization (WTO) member states (including the United States, China and the European Union) issued a joint statement on 22 April 2020 discouraging export restrictions and noting that they could lead to food insecurity. Its signatories committed not to impose export restrictions and to supporting WTO research and dialogue to ensure the function of agrifood supply chains (FAO 2020f).

Structural difficulties in emergency food imports

A deficit in its domestic maize supply had led Kenya to import maize from Uganda. However, since April, mandatory coronavirus tests for drivers at the border between the two states have seen queues of lorries stretching up to 30 kilometres (ONE n.d.).

Markus Spiske

Cash support programmes

As many as 84 countries have introduced or adapted social protection programmes; this includes 97 targeted cash transfer schemes, though only 10 countries, mainly in Latin America, specifically targeted informal workers. The amounts ranged from $39 in Colombia to $153 in Thailand. They were mostly one-off payments, except in Brazil with a monthly payment for three months (FAO 2020b).

Food support programmes

Some countries have also provided specific support in the form of free or subsidized food and some public bodies are proactively providing free meals. For instance, in India several women's self-help groups have mobilized to fill gaps in the provision of masks and sanitizers and in Delhi, free lunch and dinner are served at all local government night shelters.

Several countries have announced policies to address the disruption to school meals or food supplies to supplement cash transfers. The Government of Colombia has guaranteed the continuity of the provision of food to schoolchildren under its flagship school meals programme. It also plans food packages for 250,000 elderly people who are not receiving the corresponding cash transfer. In countries such as Afghanistan where such programmes are not in place, the government and development partners are using community development programmes, providing assistance to grain banks and supporting the distribution of food, as well as other necessities, to people in need, at the community level (World Bank 2020e). In Pakistan, over 18,000 households (mainly female-headed) will receive support to develop kitchen gardens, small-scale livestock rearing and farming (World Bank 2020d).

South Africa provides an innovative example of "spontaneous venturing", with local supply chains (small informal shops and redeployed tourism staff) used for the humanitarian distribution of food parcels, linking emergency food aid to maintaining biodiversity-centred rural economies.

Environmental compliance measures

The environmental policy measures most directly related to COVID-19 target the spread of zoonotic diseases from wild animals.[7] China has outlawed the hunting for food and consumption of terrestrial wild animals, reinstating previous legislation designed to prevent the spread of viruses from animal species (Center for International Forestry Research [CIFOR] n.d.). It is not clear how many other countries have introduced restrictions on wild meat but there is considerable pressure to do so. The United Nations Convention on Biological Diversity calls on countries to help prevent future pandemics by better controlling all types of wildlife markets. However, there widespread bans can have unintended consequences, affecting low-income rural communities that depend upon wild animal hunting. For example, the Ebola crisis and the subsequent ban on the wide meat trade and markets across West and Central Africa resulted in unemployment for thousands of women, who are the primary traders of wild meat.

India is one of the countries whose COVID-19 relief package has addressed environmental issues, with 60 billion rupees ($860 million) of funding for employment related to forest management and soil and moisture conservation works. Kenya is another example and the Government has set aside 2 billion shillings ($18.6 million) for community wildlife conservation affected by the fall in tourism (Wafula 2020).

[7] It is important to recognize that the source of the current pandemic is not yet confirmed. Nonetheless, linkages to animals (including wild and domesticated animals) are being investigated and there are influenza strains that can be transferred from domesticated animals such as pigs. See https://www.sciencemag.org/news/2020/06/swine-flu-strain-human-pandemic-potential-increasingly-found-pigs-china.

CHAPTER SUMMARY

Many of the greatest impacts of COVID-19 on the environment and food systems will come from the policy measures taken by countries and international agencies to mitigate the pandemic and recover from the crisis, and whether or not these measures account for all environmental, gender and socioeconomic impacts. This chapter has highlighted some success stories and shortcomings. Fiscal constraints have limited – and will increasingly limit – the capacity to implement support measures, especially in low- and middle-income countries. The following chapters use these examples and lessons from the sustainable development agenda to look forward to how we can rebuild better.

VI. LESSONS FROM COPING WITH COVID-19

The review in the previous section (section V) of the measures being taken leads to a number of key messages for future action. First, while significant resources are being allocated to tackling the crisis, there are still areas where support must be scaled up or strengthened, especially to address undernutrition and food insecurity, and associated, gendered, socioeconomic factors.

Even in wealthy countries, the rise in the use of food banks can be partly explained by insufficient cash provision from the state. While emergency funding will help address the increase in food insecurity, it is not enough.

Second, the support packages being implemented are very much concentrated on short-term relief and the limited fiscal resources of most developing countries mean it is unclear how long they can continue. **If there is a second wave of the pandemic, or if the infection rates continue to grow in these countries, the outlook could be extremely challenging, since fiscal room for manoeuvre will be even more limited.** This implies the need for more sustained international support in 2021 and possibly even after the COVID-19 threat has subsided to ensure a sustainable and equitable food system.

Third, **there is a real concern that focusing on COVID-19 fiscal measures risks less resources for sustainable development in general and the crowding out of other important programmes that target the SDGs in 2021 and beyond.** A report by Development Initiatives has flagged a potential fall in official development assistance of $25 billion in 2021 (Development Initiatives 2020). Achieving the SDGs will limit the impacts of future pandemics and it is important to maintain support to ensure there are "fewer people living in extreme poverty, less gender inequality, a healthier natural environment and more resilient societies" (United Nations 2020a).

Fourth, there has been a panoply of measures to support the agrifood sector, ranging from emergency financial support to farmers to more structural support for local supply chains. **Going forward, it will be critical to ensure that the right signals are sent to agents throughout the food sector to ensure its long-term recovery** (see the examples in the previous section). Emergency relief must be more consistent with long-term objectives for sustainability, resilience, equity and gender equality.

Lastly, **the measures have so far mostly ignored linkages to the environment,** including the need to prevent further loss and degradation of habitats, which can facilitate the animal-to-human transmission associated with the spread of zoonotic diseases such as COVID-19.

THE WAY FORWARD

Programmes initiated to respond to COVID-19 will need to be in place for quite some time and they will need to be strengthened in areas where they have proved inadequate. The previous section noted that more resources are required to prevent undernutrition and food insecurity, ensure that local food supply systems function efficiently and protect the ecosystems that underpin the whole agrifood system. However, it is also important not to lose sight of the time when we have brought the immediate crisis under control. To be sure, the effects of the pandemic will be present for a long time, through lower investment, the erosion of human capital and declines in global trade and supply linkages. Taking these lasting impacts into account, it is critical that the recovery addresses both the economic and the environmental challenges that lie ahead. It should be possible, as the title of this report suggests, to rebuild better, by taking advantage of positive changes in behaviour during the crises to change the way in which we travel, produce and consume food, and use our environmental resources. However, this will require a concerted effort from governments, the private sector and the other actors involved.

Rebuilding better means rethinking the paradigm of aid and development assistance. The pandemic has shown that national borders are irrelevant to global issues like health, food security and sustainability. **Rather than following traditional approaches to international development, the path forward should be for global development that relies upon multi-scaler analyses and identifies problematic dynamics between larger and smaller and richer and poorer countries** (Oldekop *et al*. 2020). The path should also prioritize support for companies and agencies for a resilient and economically-just recovery.

The way forward comprises three parts: measures to be taken immediately; short-term measures covering the next year; and deeper changes in the medium term that alter human behaviour and the structures that engender production and consumption to meet the SDGs. The proposals set out here complement the framework for the United Nations' framework for urgent socio-economic support to countries and societies in the face of COVID-19 (United Nations 2020b) and further develop the UNEP 10 Principles for Recovery. (UNEP 2020d).

VII. WHAT WE NEED TO DO: IMMEDIATE AND SHORT-TERM MEASURES

IMMEDIATE NEEDS

In line with the evolution of the pandemic in the rest of 2020 and into 2021, the current measures will need to be maintained and even strengthened in areas where they are weak.

Lack of income remains a problem that prevents adequate access to food, people living in poverty struggle to isolate (Brown, Ravallion and van de Walle 2020), health services are under pressure and resources to protect the environment are declining. These issues must be addressed urgently. The problems are greater in more unequal societies. As the development economist Jeffery Sachs notes, "high inequality undermines social cohesion, erodes public trust, and deepens political polarization, all of which negatively affect governments' ability and readiness to respond to crises". (Sachs 2020). **In the agrifood sector, the most pressing issues are ensuring the supply of inputs (including labour) and addressing difficulties moving food around inside countries.** Input problems are not only a result of COVID-19. In East Africa, a plague of locusts that damaged crops earlier this year is returning, many times bigger than before. COVID-19 restrictions have contributed to delays in receiving the pesticides needed to fight them (ONE n.d.).

Another difficulty is **keeping food moving.** Even in Africa, a continent with a relatively high level of self-sufficiency, only a fifth of food consumed is grown by the families that eat it. The rest moves down long supply chains, via lorries, processors and wholesale markets. Those who have land can depend on it for their own needs, but rural households living in poverty buy almost half of their food and a lack of stock in markets is also affecting supply (The Economist 2020). There have been major supply chain disruptions in many developing countries, especially in sub-Saharan Africa. **Action is needed to improve networks for the transportation of food that minimize loss and waste, especially the digitalisation of supply chains. Simultaneous action is needed to develop local (urban and peri-urban) food production.**
Given the restrictions on movement, a shortage of labour to work the land can be expected to cripple food systems if not addressed. In general, low-income

countries employ higher shares of labour for primary production, leaving them more exposed to direct disruptions in the labour supply, including the labour available to individual farmers. The same holds for labour-intensive production: there are various examples of how production of fruit and vegetables and meat and dairy products have already been adversely affected by labour shortages caused by the pandemic. Such deficits can be caused by domestic labour supply disruptions and shortages of seasonal and migrant workers (Schmidhuber, Pound and Qiao 2020). **Action is needed to facilitate the movement of workers in the agrifood sector, such as worker-visa programs and transportation programs, so that demands for their services can be better satisfied. Simultaneous measures are needed to prevent the spread of COVID-19 among farm workers by improving working conditions.**

Transmission in food processing workplaces has been causing problems. Some of the world's worst outbreaks of COVID-19 have been at meat processing plants owned by multinational corporations in Brazil, Canada, Germany, Spain and the United States. Over 10,000 plant workers have fallen ill in the United States and some have even died (Scher 2020). Seafood processing plants are also hotspots, for example in Ghana, where an outbreak at a tuna canning plant owned by Thai Union was responsible for a tenth of the country's COVID-19 cases in May 2020 (Seaman 2020). **Action is needed to improve health and safety conditions in workplaces with a high risk of infection.** Including by taking simple actions such as increasing access to personal protective equipment that is correctly sized for women. As noted in the UN framework for the immediate socio-economic response to COVID-19, governments need to be encouraged to design gender-responsive fiscal stimulus packages that take into account the gendered socioeconomic impacts arising from COVID-19.

Jeremy Stenuit

While these issues must be tackled now, they are also important for the long-term response. Measures build on each other, with overlaps and impacts in different places at different times. **If steps to contain the virus fail, coping and building back will be much harder, the impact will be more severe and the cost will be higher.** However, it is not only a matter of a lack of resources; it is also about being informed of the impacts and taking decisions that balance risks and benefits and set the right priorities.

ACTIONS IN THE SHORT TERM

In parallel to immediate measures, governments are planning recovery packages for 2021 and beyond. Fiscal recovery from previous crises has tended to be carbon-intensive and pay little heed to environmental concerns. For example, the financial crisis caused CO_2 emissions to fall by 1.44 per cent in 2009; however, the following year, they increased by 5.13 per cent, much higher than the pre-crisis rate (Global Carbon Project n.d.).

To restart the economy, governments usually turn to sectors where investment can easily be made, often in carbon-intensive sectors, such as construction and airlines. A recent analysis of 17 major economies finds that 30 per cent of total announced stimulus will flow to sectors with an adverse impact on climate change, biodiversity or pollution (Vivideconomics 2020). To avoid this, **specific attention must be paid to different dimensions of the recovery that decouple economic activity from carbon emissions and biodiversity loss.** There is a risk that recession could reduce investment in sustainability and that increases in poverty could induce behavioural change to cheap, short-term benefits, which must be avoided. The risk of investment in assets with high short-term returns but which plateau when carbon emission constraints bite more forcefully must also be avoided.

The OECD notes that, **at the very least, measures taken for recovery should conform to a "do no harm" criterion with respect to the environment** (Agrawala, Dussaux and Monti 2020). However, we should expect more from governments and measures should actively advance the SDGs. Environmental economists have identified three key no-cost policies that would support progress towards several of the SDGs and provide incentives for long-term sustainable development: fossil fuel subsidy swaps, irrigation subsidy swaps and a carbon tax to benefit the tropics (Barbier 2020) [8]. **Natural capital investment for ecosystem resilience and regeneration (including the restoration of carbon-rich habitats and climate-friendly agriculture) have also been identified as having a long-run multiplier and a strongly positive impact on climate** (Hepburn *et al*. 2020).

Eugene Deshko

[8] A fossil fuel subsidy swap would fund clean energy investments and the promotion of renewable energy in rural areas instead of supporting coal, oil and natural gas. Irrigation subsidies could be redesigned to improve water supplies, sanitation and wastewater infrastructure. Finally, a levy could be placed on fossil fuels to fund natural climate solutions in tropical countries.

Other promising avenues include clean energy infrastructure, clean connectivity infrastructure (e.g. low-carbon mobility), general research and development spending, clean energy research and development spending, and spending on education. Faced with the COVID-19 recession, governments should not have to trade off economic and environmental priorities. By carefully designing low-carbon stimulus packages, they can address both sets of priorities at once. There is a growing and influential community in the corporate sector that supports such measures and investment in sustainable development supports the creation of a green economy that result in equal opportunities for men, women and youth.

The selection of green stimulus packages must consider the trade-offs between the short-term multiplier effects and the implications of measures for longer-term growth. It must also take into account the extent of the "green" benefits. A study shows that activities with the greatest potential for immediate stimulus effects (in particular, for employment in the short run) often seem to be less favourable to growth (Strand and Toman 2010). Conversely, a number of activities with strong long-term impacts on growth and welfare are likely to have more limited short-run stimulus effects. The study also reviews real stimulus packages across a range of countries, finding that hardly any developing countries had a significant green component.

Tim Oun

However, **environmental clean-up, investment in sustainable agriculture, safeguarding natural resources and improving energy efficiency could generally have positive stimulus effects in the short run, as well as positive environmental effects in the longer run.** Programmes that support these dual objectives in the energy sector include energy efficiency measures in buildings (weatherproofing) and in agriculture, which could yield significant cost savings and also be relatively labour intensive. Similarly, upgrading power transmissions systems could reduce the loss of energy. Other programmes include those that target congestion reduction, sustainable and resilient food systems and energy-saving changes in cities. A recent UNEP policy brief outlines many of these "green-economy" options (UNEP 2020e). Disappointingly, however, green measures account for less than 0.2 per cent of the total stimulus spending to counter the effects of COVID-19 by the world's 50 largest economies so far (Bloomberg Green 2020), despite

evidence from the IEA that a focus on green-economy recovery options could save 9 million jobs per year for the next three years (IEA 2020b).

Regarding agriculture, there is an urgent need to rapidly rethink how we produce, process, market, handle and consume our food, as well as how we dispose of waste. This is the essence of a food systems approach to rebuilding better – evaluating all links along the value chain. These issues are discussed further in the next section on mid-term measures. In the short term, **countries must ensure that relief and stimulus packages reach the most vulnerable, including meeting the liquidity needs of small-scale food producers and rural businesses** (United Nations 2020c).

Special attention must be paid to water management. A critical priority area will be preparing for potentially significant unplanned irrigation withdrawals – often used to increase short-run agricultural productivity – ensuring they do not withdraw too much water from aquifers, lakes and rivers. Rebuilding better means constructing more resilient water, sanitation and hygiene systems that will deliver these fundamental services, despite the hydrological uncertainties of climate change and growing water scarcity and pollution. **In developing countries, there is significant potential to improve the efficiency of certain water infrastructure, in terms of reducing illicit extraction and incentivizing water-efficient agricultural practices.** Such improvements can be made by simply upgrading existing infrastructure, which is typically labour intensive. Moreover, this can be done at relatively short notice. However, given the time lag in bringing these systems online, development must start now.

BBH Singapore

The potential of green investments is huge. **The International Resource Panel notes that a 60–80 per cent improvement in energy and water efficiency in sectors such as construction, agriculture, food, industry and transport could deliver cost savings of $2.9–3.7 trillion per year by 2030, generating investment of $900 billion and 9–25 million jobs** (UNEP IRP n.d.). Nonetheless, access to financing for such investment, especially where it also addresses other environmental and social goals, will remain a challenge.

MEASURES TO PREVENT A NEW PANDEMIC: WILDLIFE AND LIVESTOCK ZOONOSIS

Another important aspect of the response to COVID-19 is reducing the potential for future pandemics. Animal-to-human transmission is the source of 75 per cent of infectious diseases and livestock rearing and wildlife trade are both significant drivers of global biodiversity loss (Taylor, Latham and Woolhouse 2001). A recent UNEP report warns that the harvesting, transport and trade of wild meat and the intensive rearing of livestock have both been linked to the emergence and spread of zoonotic diseases (UNEP and ILRI 2020). The likelihood of zoonotic diseases like COVID-19 and Ebola increases with habitat destruction, human encroachment on wildlife and current patterns of unregulated and illegal wild meat trade and consumption and wildlife trafficking (UNEP and ILRI 2020). Biodiversity experts warn of even more deadly outbreaks in the future unless habitat destruction is halted.

Feeding a growing human population in ways that minimize harm to biodiversity is imperative to prevent the emergence of another zoonotic disease like COVID-19 (Batini, Lomax and Mehra 2020). While wild meat hunting and trade can threaten endangered species, a shift from wild meat to livestock also raises concerns for many conservationists about deforestation (Bennett and Robinson 2000; UNEP and ILRI 2020). Researchers estimate that replacing wild meat in the Congo Basin with livestock such as cattle would mean converting 25 million hectares of forest into pastureland (University of Oxford 2020). Additionally, pigs and chickens are highly implicated in zoonoses (Backhans and Fellström 2012).

Chatnarin Pramnapan

Following the COVID-19 outbreak, there are growing calls to ban the trade and consumption of wildlife globally. However, the links between the consumption of wild meat, health and the environment are complex. Wild meat is an important financial backstop in parts of Africa, Asia, Latin America and the Arctic, in particular when harvests are poor or when agricultural commodity prices fluctuate, and particularly for women. If alternative sources of food and income are not provided for those who need it, bans on the trade and consumption of wild meat could result in malnutrition among the young and most vulnerable or push the trade underground, thus aggravating contributing

factors to the spread of disease (May, Gebara and Platais in press). **Such bans could also undermine a valuable incentive for communities to continue to protect wildlife.** Smart regulations and incentives, combined with adequate measures to ensure compliance, would help achieve the second objective of the Convention on Biological Diversity: *sustainable use of biodiversity.*

In terms of immediate measures, we must avoid counterproductive action that is intended to reduce the likelihood of a future pandemic but has the opposite effect. Ultimately, both efforts to shift behaviour and policies must look at these linkages as part of a comprehensive programme to mitigate risks and avoid unintended consequences.

VIII. WHAT WE NEED TO DO: MEASURES NEEDED IN THE MEDIUM TERM

PROSPECTS FOR CHANGE ACROSS THE ECONOMY

While recognizing the immense challenges the world faces, the discourse on the post-COVID future is mostly positive about the prospects of rebuilding better.

Governments, international agencies and researchers all view the crisis as having the potential to serve as a turning point to accelerate the transition to a low-carbon future, to rebalance and transform our food systems to make them more inclusive, sustainable and resilient and to increase progress towards achieving the SDGs.

One reason for this optimism is the potential for building on changes in behaviour that have been observed during the crises. There has been rapid adaptation to remote working and improvements in technology, alongside an appreciation of the benefits. As economies reopen, we may see a partial return to the pre-crisis normal but behaviour will also change permanently. One speculative estimate is that up to one-third of the global workforce will continue to work remotely, at least on a part-time basis (Global Workplace Analytics n.d.).

Standsome Worklifestyle

The other reason to be optimistic is the strong public support for a positive change in direction, including in the corporate sector. For example, **in the United Kingdom, a group of 206 major firms, including agrifood companies like Unilever, major supermarket chains like Asda and Tesco and the Food and Drink Federation have written to the Government to appeal for a recovery plan that prioritizes the climate.** The letter is also signed by companies from carbon-intensive sectors, including BP, CEMEX, Heathrow Airport and Shell (Costa Figueira 2020).

The shift in thinking on how the recovery can advance the green agenda can also be seen in the ongoing discussions in the European Union. At a meeting on 23 June 2020, ministers identified priorities for investment to create or maintain jobs, stimulate the economy and achieve steeper emission reductions of around 55 per cent by 2030, compared with the 2014 target of 40 per cent. European leaders negotiated the final shape of the recovery funding and the European Union budget for 2021–2027 over the summer with the task of both stimulating the economy and achieving steeper emission reductions. The technological and economically viable options for meeting the higher target have improved considerably since 2014. Technological progress on power and road transport and a rapid fall in the costs of wind and solar power mean that an increase of the 2030 climate target of up to 65 per cent is within reach (Hainsch *et al*. 2020). As much as 96 per cent of coal operating capacity in the European Union now costs more than renewables and COVID-19 has made the economics of coal even more challenging.

Nicholas Doherty

It is essential to build on these positive forces for a better future. The extent to which behavioural adaptations become embedded after the pandemic will depend on policy choices during the recovery period and the extent and severity of lockdown measures. The measures must reinforce the work of governments and international agencies to promote the low-carbon transition, the move to sustainable food systems and other SDGs. Moreover, in a rapidly changing external environment, **the resilience of institutions and the economy to future shocks must be at the centre of the transition.** Resilience means the capacity of institutions and economic sectors to function effectively under a range of shocks and stressful situations, **especially food systems, where UNEP can play an important role.**

Naseem Buras

DRIVING CHANGES IN FOOD SYSTEMS

The task for agriculture and food systems in the years to come is huge: providing sustainable food security for a population projected to reach 10 billion in 2050. The need to transform food systems was clear before the pandemic struck. This report has shown the additional challenges COVID-19 has created for food systems and how they have influenced the pandemic – from its suspected zoonotic origins to the compound health complications of obesity and NCDs. The question is how economic stimulus packages can help to build systems that are better than the current one? Rebuilding better includes ensuring healthy diets, slashing food loss and waste, reducing GHG emissions to limit climate change and adapting to its inevitable impacts, reversing habitat loss, limiting animal–human disease transmission, developing rural areas to create jobs and to improve the livelihoods of people living in poverty, and maintaining ecosystem services, such as clean water and air, on a rapidly urbanizing planet. Factors such as unequal access to land tenure, financial resources and decision-making power can create economic stress in households, leaving women disproportionately exposed to climate-related food security risks. Securing land rights for local communities can help address these issues to some extent. Health, Education and Gender Equality are key developmental outcomes as well as the means by which crucial aspects of the SDGs might be achieved. For example, recognizing women's decision-making role within the home in deciding meals for their families and therefore tailoring specific nutrition and sustainability messages towards them, may help in eradicating health problems. By addressing these issues simultaneously, we are helping to prevent the future spread of zoonotic diseases and to build resilient, sustainable and healthy food systems.

Tackling these challenges requires a systematic approach, as suggested by a report (The Economics of Ecosystems and Biodiversity [TEEB] 2018). Increasing food production without significant progress on reducing the environmental impacts of food systems is not sustainable in the long run. **Estimates of the negative externalities of the food system amount to $12 trillion a year, equivalent to about 8 per cent of global GDP in 2019** (The Food and Land Use Coalition 2019). While we have yet to realize a comprehensive vision of the whole agrifood system, encompassing social equity and jobs,

as well as health and environmental impacts, the steps needed to do so are becoming increasingly clear and momentum in this direction is growing. The recent CGIAR report on climate change, agriculture and security identifies four critical areas for action: (a) rerouting farming and rural livelihoods to trajectories with lower GHG emissions, less inequality, gender and social inclusiveness, and incentives for climate-resilient practices that meet dietary needs; (b) de-risking livelihoods, farms and value chains to reduce the impact of variable weather and extreme events; (c) reducing emissions from diets and value chains; and (d) realigning policies, finance, support for social movements and innovation to build resilient and more sustainable food systems (Steiner *et al*. 2020). A food systems approach would also include the need to reduce food waste, address the drivers of obesity, protect biodiversity and, more generally, value the ecosystem functions on which agriculture depends.

The analytical tools for implementing such an approach in planning for future food systems are available. They must now be used through a wide range of platforms and initiatives, such as the SDGs, which are tackling these complex issues. They also need to be mainstreamed in private-sector decision-making. Only on the basis of such a complex and comprehensive analysis can a transformation towards sustainable food systems take place. The COVID-19 crisis has given impetus to this step in light of its links to both the supply of certain foods and to the habitats in which the wild animals that are eaten live. The crisis has also raised awareness of zoonotic disease.

Steve Rybka

To complement this, UNEP, FAO and other agencies are actively engaged in measures to promote a sustainable agrifood system, including reducing food waste and encouraging healthier diets linked to lower GHG emissions. COVID-19 has increased interest in all of these issues across individuals and governments, meaning they are now high on the agenda of the international community. **The United Nations Food Systems Summit organized by the Secretary-General in October 2019 for September 2021, will provide a critical opportunity to raise global ambition, to understand the problems that must be solved, and to set a course to radically transform our food systems.** Each stage is influenced by taste, cost, health, convention and

freshness. At the same time, awareness of the options and impacts of different ways of doing things affects our choices. There is also potential for the use of economic instruments, such as a packaging tax or a tax on foods based on their carbon footprint or sugar content (the latter has been introduced in some European countries).

The pandemic has also turned our attention to food supply chains. On the one hand, there is a concern that COVID-19 will reduce confidence in global food supply chains, which feed billions and have proven efficient and cost-effective. On the other, there is a growing interest in local supply chains and more environmentally friendly local foods. In practice, being closer does not always mean being greener: it also depends on how produce is grown and the inputs, including fossil-based energy. **We need a full life-cycle analysis along the lines proposed by The Economics of Ecosystems and Biodiversity (TEEB) report to determine the most effective combination of local and global supply chains, recognizing that there is scope for both** (TEEB n.d.). Global supply chains should be used where favoured by comparative advantages, climate and economies of scale, while local ones should be promoted where they can meet the demand more effectively and sustainably. In other words, support should be provided for a shift from tightly controlled value chains to more flexible business models that are resilient to the kinds of shocks food systems will face in the future. The World Bank programme of e-vouchers for subsidies in Kenya cited earlier in this report is a good example. Finally, given the inherent uncertainty around how food systems evolve, it is critical for developments in this area to be closely monitored in order to respond correctly.

PROTECTING HABITATS AND PREVENTING THE DEGRADATION OF ECOSYSTEMS

The environmental community has long been aware of the loss of ecosystem services due to the degradation and loss of habitats and biodiversity.

Mathew Schwartz

As Robert Nasi, Director General of the Center for International Forestry Research (CIFOR) recently remarked:

> *different mechanisms are involved, but landscape change and biodiversity loss cause major shifts in the ecology of pathogens and their vectors. These favour the expansion of hosts or vectors, increase pressure for virulence or resistance selection and/or for the evolution into more genetically diverse pathogens' strains, increasing the probability that one of these strains can spill-over to humans (Mollins 2020).*

The current crisis has made the wider public more aware of these issues. The risk from zoonotic diseases is exacerbated by the destruction of habitats for wild animals and the overexploitation of these species. Unfortunately, most of the response to COVID-19 has treated this as a medical issue or an economic shock, ignoring the root causes, which relate to the environment, unsustainable food systems and animal health. A recently released scientific assessment from UNEP and the International Livestock Research Institute (ILRI) argued that unless countries take dramatic steps to curb zoonotic contagion, global outbreaks like COVID-19 will become increasingly common (UNEP and ILRI 2020). We must acknowledge the interdependence of nature, humans and food systems, and evaluate the implications of wild and domestic animal consumption for food security, food sovereignty, sustainability and the risk of zoonotic diseases (May, Gebara and Platais *in press*).

One proposal is based on emerging from the crisis with an international implementation plan for One Health, an integrated approach that prevents and mitigates the threats at animal–human–plant–environment interfaces (FAO n.d.). The issues addressed by the One Health approach include ways to reduce the zoonotic risks posed by livestock and wild animals as well as reducing the consumption of meat, where appropriate, alongside changes to habitats and land use from agricultural conversion, while improving environmental surveillance. The approach must be designed and implemented in a broader systems context. Implementation should also include inviting stakeholders from public health, gender, biodiversity, climate and agrifood systems to develop common guidelines for national stimulus packages (Laurans *et al.* 2020). This would also capitalize on United Nations inter-agency working groups on biodiversity and health, as well as the One Health tripartite alliance.

SDG targets 15.1, 15.2 and 15.3 set clear objectives for reversing the loss and degradation of animal habitats[9]. This shows the presence of an agenda for measures to reduce the risks of future pandemics. However, the problem is catalysing the action needed to achieve this. Given the enormous costs of the COVID-19 crisis, countries should invest in achieving these goals and in reducing the risk of future pandemics. **Surveillance tools must be**

[9] Target 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements. Target 15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally. Target 15.3: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

sharpened and mechanisms applied to regulate threats such as the illegal, unsustainable and unregulated trade in timber and wildlife and the use of toxic pesticides. This will require strong support for the post-2020 Global Biodiversity Framework. COVID-19 could mean more resources allocated to achieve these targets and governments prioritizing them.

PROMOTING LOW-CARBON LIFESTYLES

We have already noted the potential for a faster transition to a low-carbon economy and society, and the impetus derived from the pandemic. A key difficulty so far in implementing the transition to a resilient low-carbon society has been the issue of economic justice and social inequality, since people involved in carbon-intensive sectors could lose out from the transition, with a lack of immediate options for alternative livelihoods. The pandemic is also increasing economic and health inequality both within countries and between rich and poor countries (Blundell *et al*. 2020). The impact on employment is more pronounced among people with lower incomes and lower education. Similarly, while debt can increase for low-income households, wealthier households are seeing an increase in savings.

The implications of these factors on policies implemented in pursuit of a low-carbon economy mean that policymakers must be mindful of their distributional effects. One example is promoting remote working to reduce transport-related emissions. Research has shown that the share of work that can be done from home varies significantly for countries with different incomes: in urban areas, this share is only about 20 per cent in low-income countries compared with 40 per cent in high-income countries. Educational attainment, formal employment status and household wealth are positively associated with the possibility of working from home, reflecting the vulnerability of certain groups of workers (Gottlieb *et al*. 2020). **This means that measures to encourage working from home will need to be complemented with others to improve access to the infrastructure that makes this possible.** A second policy that could reduce GHG emissions is buying locally, avoiding long-distance transport. While such a policy has the potential to reduce transport emissions, it could prove devastating for developing countries that export fresh produce, such as fruit, flowers and livestock products. Moreover, when all life-cycle emissions are taken into account, it may not actually reduce emissions. **As such, food system investments should follow the results of life cycle assessments and economic impact analyses.** Third, in light of the significant labour supply shock caused by the pandemic, it is important to note that **green industries will not be able to hire unemployed workers unless there is a strong programme for retraining and relocation.**

IX. CONCLUSIONS

The global sustainable development agenda must promote the resilience and sustainability of food systems via a framework of policies and measures that (i) account for environmental thresholds and trade-offs; (ii) promote food security and healthy diets; (iii) enhance and protect rural livelihoods; and (iv) address the inequalities and injustices that have emerged during the crises and that will continue to prevail during the post-pandemic transition. UNEP will play an important role in ensuring that rebuilding better does not lose sight of these important considerations.

Given uncertainty regarding how the pandemic will evolve, we must assess its positive and negative consequences and the impact of the measures taken in response for the environment and the SDGs.

Support will most certainly be needed from the international United Nations agencies to ensure effective implementation of this framework. One way of doing this will be to provide support to countries to monitor the environmental impacts of COVID-19. Similarly, it will also be necessary to assess the wider social and natural capital consequences of the different policy responses and financial stimulus packages that have been used and to capture opportunities for leap-frogging to green investments and promoting nature-based solutions to rebuild better. The effectiveness of recovery and stimulus packages should be measured against indicators for progress on the SDGs. Additionally, a United Nations agency could also take the lead in expanding the environmental dimensions of the One Health approach to improve the understanding of linkages and impacts when it comes to zoonotic diseases.

As several UNEP publications have already noted, measuring increases or decreases in GDP does not provide all the information needed to guide the process of rebuilding better (TEEB 2009; UNEP 2018). It will be important to track the impact of the pandemic and the response on all four types of

capital: physical, human, natural and social. While the effects on human capital are most obvious, effects on natural capital are particularly important, since it is the foundation of food production. This information can help guide countries and serve as an international monitoring framework for a green recovery that can contribute to multiple goals. The examples of the impacts of COVID-19 summarized in table 1 would benefit from analysis in terms of the four types of capital, alongside considering the consequences of aspects such as disrupted supply chains, working conditions in food processing plants (especially slaughter houses) and changes in the demand and supply for food products.

This report makes clear the importance of a rapid and effective response to the environmental challenges of COVID-19 and of preventing a recurrence of similar events. Although the costs of these measures have not been worked out in detail, a general comparison of the figures suggests that the cost of preventing further pandemics over the next decade by protecting wildlife and forests would be just 2 per cent of the estimated financial damage caused by COVID-19, proof that prevention is better than cure (Dobson *et al.* 2020).

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